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Current Experience in Multiphasic Health Examinations*

Orientation and Background

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IN the past twelve months, multiphasic health examination, multiphasic screening, or multiple screening, as it is variously called, has gained currency in the public health lexicon. Will multiple screening eventually become an effective public health procedure, or will it end as an obsolete term in the dictionary—like fomites or miasma—with no more practical value than the magic formula "abracadabra"? The answer to this question depends upon the frame of mind in which all health officials, their staffs, and the medical profession approach multiple screening. In my opinion, the concept of multiple screening has a brilliant future, but the only valid approach at the present time is experimental.

Multiple screening has emerged as an experimental procedure from several well known public health practices. The basic origin of the procedure is the use of mass laboratory testing in exposed population groups as a means of controlling epidemics. Another basis of the multiple screening idea is the routine health inspection of certain population groups, such as school children and industrial workers. The modern concept of case finding, however, has been the principal stimulus to the development of multiple screening. Whereas mass testing was at first applied only to exposed groups in outbreaks of infectious disease, case finding now implies the search for disease of continuously high prevalence in large general population groups. Thus, the use of diagnostic techniques has shifted from a rear-guard action against epidemics to an offensive against certain chronic diseases—tuberculosis, syphilis, diabetes, heart disease, and so on.

It is safe to say that never has a mass case finding operation been 100 per cent accurate, for no test has been developed that is "foolproof." Yet no physician or medical scientist should regret the mass application of diagnostic techniques any more than he does their application to single patients. Without the persistent analysis of specimens collected from ex-

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posed population groups in epidemics of typhoid fever, diphtheria, scarlet fever, and amebic dysentery, for example, we would not have discovered the "carrier state" in these infections. Without the mass application of tuberculin testing, the Schick test, the Dick test, and others, our knowledge of immunology and allergy would be far less advanced than it is today. In many cases, epidemiological studies including such tests have made it possible for public health administrators to simplify and make more effective their control procedures. Mass application of serodiagnosis in syphilis control has likewise stimulated improvement of techniques to the point where the proportion of false positives can be negligible. I say "*can* be" because even with a high degree of sensitivity and specificity, a test can fail by reason of poor performance.

The health inspection of school children and industrial workers has been an accepted public health method for many years. As performed in the schools, the examination has been superficial in most cases and has not included the use of specific diagnostic techniques. In the past ten years, many large industrial establishments have incorporated serodiagnosis of syphilis and chest x-rays in their preëmployment examinations of workers. Workmen's compensation laws have stimulated the performance of relatively thorough physical examinations in plants maintaining a medical service. The majority of industrial workers, however, being employed in small establishments, receive superficial health inspection, or none at all.

During the past two years, the Public Health Service has participated in six community demonstrations designed to integrate certain case finding techniques and certain features of the health examination into a single operation, for application to general population groups. These multiphasic demonstrations have been conducted under various auspices, and under widely varying conditions.

There are, however, certain factors common to all six of the programs which will be described by the other speakers. For example, all six have been conducted in coöperation with state and local medical societies. Persons presenting themselves for examination have done so voluntarily, and those found to require medical care have been referred to local physicians or other sources approved by the medical profession.

It will be seen that there have been marked variations in these demonstrations: variations in purpose, organization, operational methods, type of public appeal, number of techniques employed, number of persons examined, and average time required to put a person through the examination. Under such varying conditions, it should not be surprising that preliminary tabulations will also show marked variability in the findings.

The Public Health Service believes that a certain amount of variety is desirable in the current stage of multiphasic programs. We should, however, include in our plans long-term studies to determine the relative effectiveness of the different methods employed. We should be prepared to discard the ineffective and should seek at all times more efficient methods.

Perhaps the most significant variant in the programs to be discussed is the difference in basic purpose. It is true that all six were undertaken as experiments in the multiphasic procedure; that is, to combine various techniques into a single operation requiring a minimum of professional personnel. What is the basic aim of the procedure, though? Two of the programs are being conducted for the purpose of raising the level of preventive medical services to the people of the community. The other four were conducted for the purpose of mass case finding. Such a difference in aim is found to affect the methods of organiza-

tion and operation, as well as the type of public appeal. It may be that variations in purpose will thus affect the ultimate results.

We should be aware of these differences as we follow the reports on the six programs. We will note, for example, that two of the programs have been established as regular health services. The other four were conducted as "one-time" affairs following the pattern of earlier mass case finding campaigns in syphilis control and tuberculosis control, singly or in combination. The two programs established as regular health services are conducted in permanent clinical facilities; the multiple screening campaigns were conducted in temporary facilities, varying from trailers parked at different sites in the community to department stores.

Besides the differences in the numbers and types of techniques employed, we will note also a marked difference in average amount of time devoted to the examination of a patient. The average time in the programs conducted in permanent clinical facilities is two to three times as long as that in the multiple screening campaigns. Perhaps one is justified in naming the former programs "multiphasic health examinations," since they include a careful medical examination and are available for periodic check-ups.

Intensive publicity campaigns have been necessary in the mass multiple screening programs, because each was set up to operate for a limited period. As a result, large numbers of persons have presented themselves for examination. On July 1, 1950, a total of more than half a million persons had passed through the multiple screening lines in Richmond, Va., Atlanta, Ga., the State of Alabama, and Hartnett County, N. C. Obviously, the four populations from which the total was drawn possess varied demographic characteristics. Students of the recorded findings, however, are faced with serious questions as to whether the persons who responded to the public appeal constitute a group representative of the total population in which the program operated, or even of those socio-economic segments most likely to have a high prevalence of undetected, untreated disease. It may be that the type of public appeal has had a selective influence. Thus it is difficult to draw valid conclusions as to the prevalence of the pathologies under study.

These issues are important from the public health point of view. If the primary goal of a multiple screening program is to discover the largest number possible of hitherto unknown cases, with a minimum of expense and effort, then our planning and operations must be directed to reach the groups most likely to yield results. If a secondary aim is to determine more accurately the prevalence rates of certain diseases and defects, then we should reinforce the data from multiple screening programs with sample studies of the "screened" populations to determine the reliability of the findings. Such studies should provide a means of correcting the screening data so as to yield reasonably accurate prevalence rates. Several communities are conducting such appraisals, and the Public Health Service is conducting a post-survey study of this type in Atlanta, Ga.

Multiple screening appears to offer many opportunities for increasing the efficiency and economy of early case finding and for expanding its scope. The specificity and sensitivity of some of the screening devices are still low and yield some false positives. The blood sugar determination for diabetes is in this category. As yet, we have no reliable device for detecting cancer which meets the ideal operational requirements of a large multiple screening campaign. Only small pilot explorations are in order at the present time for the application of cytologic tests, for example, in the dis-

covery of cancer of the lungs and uterus. Multiple screening programs have not yet devised a procedure determining the proportion of false negatives—a weakness which must ultimately be corrected. We need to do much hard, well controlled work to improve our techniques and tests.

The effectiveness of any case finding program depends upon the proportion of cases brought under treatment. A one-time case finding campaign for conditions like heart disease, diabetes, obesity, and other physical defects, however, has almost no effect on the number of new cases that will occur the following year, even if a high proportion of the newly discovered patients receives appropriate care. In contrast, effective screening of syphilis and tuberculosis is a valuable control method, since every case brought under treatment removes a source of infection from the population.

A question which yet remains unanswered—and it is indeed a serious one—concerns the ability of current private and public resources for medical care to handle the large numbers of persons referred to them for diagnosis and treatment in the wake of a mass multiple screening campaign. We hope to get some answers to this question in the follow-up of recent programs.

Still not specifically answered is a question of major concern to health officers. "How much does multiple screening cost?" The question itself has many ramifications. The unit cost per confirmed positive case is likely to be two to three times the unit cost per person screened. Moreover, the costs are dependent upon the number and type of techniques applied, the amount of free help provided in the way of facilities, voluntary personnel, and so on. Another factor to be considered in one-time multiple screening operation is the cost of processing "rediscovered" cases; that is, patients who are already known to the health department and are receiving treatment, but still are showing positive reaction to a test such as serodiagnosis of syphilis.

I have purposely raised these questions and pointed out these issues. The Public Health Service has an active interest in multiple screening and we are promoting programs in several communities. We do feel, however, that many of the procedures are experimental. In a recent issue of *Public Health Reports*,[1] Dr. J. W. Mountin has explored this whole problem in detail and has raised many more specific questions than I can do at this time.

There is a continuing need for basic and applied studies leading to additional and more effective diagnostic techniques adaptable to mass application. There is need for research in methods of organization, administration, technical operations, and statistical control. There is need for studies of the socio-economic effects of multiple screening programs, and for carefully planned and thoroughly applied techniques of appraisal and evaluation.

If the multiphasic health examination or the multiple screening campaign is to be woven into the fabric of public health, it must be directed toward the basic goal of raising the level of preventive medicine in the community. A multiphasic program can be a powerful force for integrating preventive and curative medical services; or it can be an equally potent divisive force, weakening *both* essential types of service by its effects on public opinion and attitudes. If the program does not satisfy basic needs and desires of the people, the people will lose faith in their public health services or their private medical services, or both.

In these initial stages of experiment, of trial and error, therefore, it is essential that all responsible persons think through a proposed multiphasic program to its logical, long-range conclusions. The focus of thought is the patient—the human being, sick or well, in his total

environment; the prime consideration is for the physical, mental, and social problems of each individual who presents himself voluntarily to his health department as a "guinea pig" in this new way of "processing" his blood, heart, lungs, eyes, ears, and so on.

Multiple screening is such a promising public health procedure that all of us are anxious for it to have the best possible opportunity to yield its fullest potential results. Unquestionably, it has captured the imagination of public health workers and the general public; for the demand for multiple screening programs is already outstripping public health resources.

Moreover, the concept of multiple screening is basically sound and fits in admirably with the current trend in public health work generally, toward a unity and greater integration of programs than we have had in the past. Multiple screening offers a type of activity in which specific disease control programs can be welded into an integrated approach to the solution of health problems. Because of these potential values, discussions such as the American Public Health Association has arranged can be of the greatest possible assistance in increasing understanding of the procedure and in stimulating all of us to further its development on the soundest possible basis.

REFERENCE

1. Mountin, J. W. Multiple Screening and Specialized Programs. *Pub. Health Rep.* (Oct. 20), 1950.

How Prevalent Is Chronic Disease?

The Hunterdon County (N.J.) Medical Center, now in process of construction and organization, has been given a grant of $60,000 by the Commonwealth Fund for a study of the incidence of disabling chronic illness in a rural population. Based on plans developed by the National Commission on Chronic Illness, it will attempt to find out how many persons are chronically ill and what the needs are for hospital beds, home care programs, rehabilitation, and other community services. The director of the Hunterdon Medical Center, Ray E. Trussell, M.D., will direct the study.

A similar study is to be made in an urban area for which a preliminary grant of $10,000 has been made to the Commission on Chronic Illness by the U. S. Public Health Service. These two pilot studies are expected to provide yardsticks and develop methods for determining incidence of long-term illness and the related community needs.

Current Experience in Multiphasic Health Examinations*

Experience at Richmond

E. M. Holmes, Jr., M.D., F.A.P.H.A., Director; and Paul W. Bowden, M.D., M.P.H., Assistant Director, City Department of Public Health, Richmond, Va.

A multiple screening pilot study at Richmond was conducted for a seven months period ending on July 30, 1950. Tests were made on 37,329 persons for syphilis, diabetes, anemia, blood pressure, heart abnormalities, tuberculosis, hearing, and vision. One of every 12 persons (3,125) was given an electrocardiogram and 2,987 received a tonometer test for intraocular tension. The authors summarized the development of the concept of multiple screening, pointing out that in 1939 the industrial population of Richmond was surveyed for tuberculosis and syphilis through a combined chest x-ray and serologic test procedure.

Results of the multiple screening survey were as follows:

The Kahn presumptive test segregated 322 persons for further investigation—a lower figure than was expected.

The urine test for diabetes revealed 347 positive reactors and 170 doubtfuls from 35,010 tests applied.

Hemoglobin determinations were done by a Dare hemoglobinometer. Of 37,081 persons 4,914 had readings under 12 gram per cent, which was considered as low level for normal.

Blood pressures were taken on 37,177 individuals with similar clinical conditions existing for all persons tested. Using 150/100 as high limits, there were 5,370 persons with an elevation of either the systolic or diastolic pressure over these levels: of these, 1,667 had both systolic and diastolic pressures higher than these levels.

One person out of 12 was given an electrocardiogram; 3,018 were read and verified and definite abnormalities found in 194, and doubtful readings in 229.

There were 30,432 chest x-rays read for total pathology. Of these, 1,290 were classified abnormal as to findings pertaining to the lungs, and 1,561 as to cardiac abnormalities. On retests, 496 showed definite pathology due to tuberculosis, and 300 showed other abnormalities. There were 5 cases of active tuberculosis and 34 suspected of being active. The survey uncovered far more healed tuberculosis than had been anticipated.

Some conclusions arrived at through survey experience were these: A survey stimulates public interest in health; enhances patient-physician good will; encourages good will and coöperation between the health department and local voluntary agencies; and it is economical. (On the basis of 37,000 tested, the cost per person was $1.79.)

For economy as to money and personnel, a short intensive program is best. Remediable conditions which decreased attendance were: poor location of unit,

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crowded quarters, and discourtesy.

Essential are adequate pre-planning, physician's support, proper laboratory services, consultation services, and in fairness to those who have been tested, case follow-up.

Experience at Atlanta

C. D. Bowdoin, M.D., M.P.H., F.A.P.H.A., Director, Division of Venereal Disease Control, Georgia Department of Public Health, Atlanta, Ga.

On June 30, 1950, the health departments of Metropolitan Atlanta, in cooperation with the Georgia Department of Public Health and the U. S. Public Health Service, terminated a multiple screening health survey of the Greater Atlanta area. Two hundred and thirty-six thousand individuals were tested during the survey which lasted just under three months. Screening tests included blood tests for syphilis, diabetes, and hemoglobin; chest x-ray examination for tuberculosis and other chest pathology and for abnormalities of the heart; height and weight measurements; and dental examinations.

For the blood test for syphilis, the V.D.R.L. rapid slide test was made. Those with positive or doubtful findings were called back to the secondary testing station for a repeat V.D.R.L. and a confirmatory Kahn test before being referred for diagnosis and treatment. The State Health Department provided communicable disease investigators who expended every effort to obtain coöperation from individuals with positive or doubtful screening findings in returning for retest or making arrangement for treatment.

For chest x-ray, the 70 mm. photofluorograph was used. For retest, a 14 x 17 chest x-ray and other confirmatory tests, as indicated, were made.

The copper sulfate specific gravity method was used for the hemoglobin screening test. All males with hemoglobin concentrate below 11 gm. per cent and all females below 10 gm. per cent were advised to see their physicians for further study.

The newly developed Anthrone test was used for blood sugar.

The dental examination included extra-oral examination of head, face, and neck. Enamel dystrophies such as Hutchinson's teeth and endemic flourosis were noted. Mucous membranes of the tongue, cheeks, and lips were examined for infectious, neoplastic, nutritional, and other pathological conditions.

According to laboratory reports, out of 228,266 tested for syphilis, there were 22,395 reactors. Of these 14,317 were positive and 8,078 were doubtful. The final disposition of 14,526 cases was reported as follows: 1,016 found to be not infected; 1,314 infected, with no previous treatment; 441 could not be located or had moved out of the jurisdiction; and 2,070 had other dispositions.

Diagnoses of the 1,314 with no previous treatment were distributed as follows: primary 7; secondary 40; early latent 210; late latent 806; cardiovascular 7; neurosyphilis 14; other late 1; congenital 220; and not known 9. The 220 cases of congenital syphilis discovered by the survey exceeded by 10 cases the total number reported to the Atlanta Health Department during the previous 3 years.

The hemoglobin test on 180,128 persons showed 9,749 to be abnormal.

Of 211,639 tested for blood sugar, 7,051 were found abnormal.

Out of 212,833 x-ray examinations,

1,643 cases of tuberculosis were found on retest, with 1,342 cases previously unknown.

X-ray films read for cardiovascular conditions showed that 1,911 persons had an abnormal or doubtful heart condition and were referred to their physicians for further observation.

Following the dental examinations, 36,610 persons were referred to their dentists for immediate treatment.

The author concludes that the Greater Atlanta Survey has substantiated the assumption that a multiple screening project, with proper publicity and choice of station locations, is a most effective method of getting people in for examination.

Experience in Alabama

W. H. Y. Smith, M.D., Director of Preventable Diseases, Alabama State Department of Health, Montgomery, Ala.

Four diseases were looked for under Alabama's multiple screening program—heart disease, tuberculosis, diabetes, and syphilis. Alabama requires by law that all people in the 13 to 50 age group must have their chests x-rayed, and those in the 14 to 50 group have a blood test for syphilis. Since the State Health Department had to perform tests for tuberculosis and syphilis, little extra effort was required to interpret the chest x-ray for heart abnormalities and to test the blood samples of these and other groups for diabetes.

From November 7, 1949, to October 13, 1950, 22 counties were surveyed and 356,014 people examined.

The examining units consisted of a nurse, 9 clerks, 2 x-ray technicians and a mobile x-ray unit. Each team handled 5,000 people every 2 weeks. Within 3 to 4 weeks after the screening examinations took place, retests were in operation. After the retests, those needing treatment or further study were referred to clinics or physicians.

Because of the slowness in the final evaluation of tuberculosis, heart disease, and diabetes findings, provisional results are given for large groups and final results for smaller groups.

Of 109,967 people x-rayed in 8 counties, there were 198 active cases of tuberculosis and 342 suspects.

Of 168,290 persons screened in 12 counties, heart disease was found in 1,105, and was suspected in 198 persons.

A modified picric acid test was used to determine blood sugar. Of 219,228 persons tested without regard to food intake, 14,767 were found with a blood sugar of 150 mgm. or more per 100 ml. of blood. These persons were retested after having taken 50 gm. of dextrose in lemon flavored water. The blood sugar test, made 45 minutes later, showed 4,620 of the 14,767 suspects to have a level of 180 mgm. or more. Physicians' reports on 1,966 suspects revealed that about 44 per cent were negative on re-examination. Completed results showed 1,597 cases of diabetes out of 54,808 individuals tested in 4 counties, or a prevalence rate of 2.9 per cent. In age groups, the rate steadily rose from age 9 to 48.

Completed examinations showed 4,747 persons with syphilis out of 221,312 tested in 16 counties, or a final prevalence rate of 2.1 per cent.

After follow-up, penicillin therapy is provided by state public health teams, or in one county (Pickens), by local physicians who are supplied with penicillin. Patients who lapse in their treatments are sent to the rapid treatment center.

Experience at Boston, Mass.

Vlado A. Getting, M.D., F.A.P.H.A., Commissioner; and Claire F. Ryder, M.D., Administrator, Massachusetts Department of Public Health, Boston, Mass.

The multiphasic screening program in Massachusetts originated December 1, 1949, in a pilot Health Protection Clinic established by the Massachusetts Medical Society and the Massachusetts Department of Public Health at the New England Center and Pratt Diagnostic Hospital at Boston. The project was financed jointly by the State Health Department, the Public Health Service, the Massachusetts Heart Association, and the American Cancer Society (Massachusetts Division).

Procedures included: (1) a 222-question Self-Screener medical history filled out by the patient before examination; (2) blood test for serology, sugar, and hemoglobin; (3) urine test for sugar and albumin; (4) vision test; (5) hearing test; (6) 70 mm. chest x-ray; (7) recording of blood pressure readings; (8) measurement of height and weight; (9) temperature; (10) pulse and respiration; physical examination of at least 20 minutes duration, including rectal and pelvic examination where indicated.

One objective was to evaluate the history and the clinical tests with a view to eliminating the physical examination. If suspicion of disease is raised by history and clinical tests alone, individuals needing a physical examination would be sent to their physician.

Persons suspected of having disease are referred to their physician or an outpatient clinic for definitive diagnosis and treatment. Physicians are asked to inform the Health Protection Clinic of their final diagnosis. After a reasonable length of time, a public health nurse calls on the physician to determine whether referred patients have been to see him and a social worker calls upon patients who have not visited their doctor. Follow-up is also made on a random sample of normal cases to determine if conditions have been missed in screening.

In the period December 1, 1949—June 30, 1950, 2,620 persons were screened. Of the first 2,000 screenees, 1,266 persons (63.3 per cent) were referred for abnormal conditions; of these, 1,117 were referred for conditions not previously under medical care. In the latter group, 1,730 previously unknown conditions were found, or 1.5 defects per person.

The major unknown defects found were: obesity (353 persons); vision (212); hypertension (173); heart disease (159); hearing (140); cancer (102 persons with lesions suspected of being cancer). At the time of the report, 7 cases of proven cancer had been diagnosed. The suspicious cancer lesions included other serious but non-malignant conditions of the breast, rectum, uterus, and cervix. Other conditions included: underweight (30); diabetes (47); anemia (29); tuberculosis (17); and syphilis (8).

Of the 1,730 previously unknown defects, 85 per cent were found by the history or clinical tests alone. Without the 20 minute physical examination, only 15 per cent of the unknown defects would have been missed. Only 702 of the defects could be considered as detectable by physical examination alone, and only 251 (or 36 per cent) of these were actually discovered by the examining physician. The authors conclude that if the physical examination were reduced to an average of 10 minutes, including general observation, auscultation of the heart, palpation of breast and abdomen, and rectal or vaginal examination when indicated, nearly all of the

positive signs for heart disease, suspected cancer, gynecological conditions, and some other obvious defects could be found as readily as in a 20 minute examination. A second pilot clinic is being operated on that basis.

The cost of the initial clinic, including rent, personnel, supplies, equipment, analysis, and follow-up, was $13.37 per person screened. The cost of the second clinic is estimated at $9.55 per person. It is estimated that the cost (excluding rent and purchase of equipment) can be reduced to about $1.50. The costs of individual procedures in the initial clinic ranged from 10 and 11 cents for the syphilis and hemoglobin tests to $4.25 for the physical examination.

The authors conclude that a mass screening procedure which includes a limited physical examination and a detailed history is more effective than one employing only screening tests. The history, however, is an important device which picked up approximately two-thirds of the defects susceptible of discovery by physical examination; it is less costly and may supplant physical examination in health protection clinics. Final evaluation must await thorough follow-up of both positive and negative findings.

Experience at Indianapolis

Gerald F. Kempf, M.D., Director, City Department of Public Health, Indianapolis, Ind.

The pilot study in multiple screening at the Herman G. Morgan Center at Indianapolis was conducted through the coöperative work of the Department of Public Health and Hospitals of the City of Indianapolis, Flanner House, Indiana State Board of Health, Department of Public Welfare of Indiana, the Children's Bureau, and the U. S. Public Health Service. The federal agencies contributed leadership, equipment, and personnel. The program director was responsible to the local Director of Public Health.

The Herman G. Morgan Health Center serves a population of more than 80,000 Negroes, and serves primarily as a health education and case finding center.

Adults only were admitted to the screening sessions, although the public health clinics were conducted as usual at the same health center. Patients with serious or doubtful findings, revealed by tests and by answers to questions, were rechecked and interviewed by a physician before being sent to their own physicians. The tests were: height and weight, chest x-ray, blood sugar by the Wilkerson-Heftmann method, SFS by Mazzini method, hemoglobin by photoelectrocolorimeter, blood pressure, hearing by audiometer (Microtone ADC), eyesight by American Optical sight screener, urinary sugar by Clinitest, albumin by Heller method, auscultation of the heart, and a series of questions designed to bring out disease history. Rechecks, done twice a week, were: blood and urinary sugar, STS, blood pressure, albumin, hearing, and 14 x 17 roentgenograms. Results of the tests were evaluated through the use of reports from doctors and clinics to whom the patients had been referred.

The team has attempted to carry out these tests in from 3 to 6 minutes at each station. The coöperation of physicians and clinics was necessary to the success of the program. Other requirements were that the tests given be fruitfully informative and that they could be done quickly and easily by technicians.

Of the 2,022 persons examined 74.5

screened as positive. After rechecks, the figure was reduced to 67.9. Thirty-four per cent had visual defects requiring correction, and 12.5 per cent had definite hearing loss. Thirty-seven per cent had more serious defects such as cardiovascular diseases, diabetes, renal disease, syphilis, and tuberculosis. Of these, more than half were in the cardiovascular group.

The adjusted average cost was 19 cents per test or $2.25 per person screened. One of the problems encountered was the difficulty of getting the patients in for rechecks, and in persuading those with positive findings to consult a physician. Many of them had never had a doctor and chose to continue to make little or no use of the medical services available to them with or without pay. These difficulties made it essential to have well trained personnel to carry out this part of the program.

Experience in a Medical School Clinic

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At a clinic established by the Tulane University School of Medicine, primarily for the detection of cancer, a thorough physical examination and a complete medical history were coupled with the laboratory findings and special procedures generally used by multiple screening projects during the past year.

The physical survey at the Tulane clinic was made by physicians of the departments of medicine, surgery, and gynecology with help from the clinical laboratories, x-ray, and other necessary services.

In the entire series of 2,971 persons examined, there were 185 with various findings which caused suspicion of malignant disease, and 27 were definitely proved to have malignant disease. Evidences of heart disease were found in 148 individuals and as electrocardiograms were not routinely done, the diagnoses resulted from data obtained on history, physical examination, and chest x-ray. In a group of 50 cases involving arteriosclerotic, hypertensive, and rheumatic heart disease definitely unknown before, 40 were not picked up by x-ray.

Results clearly showed that the x-ray examination, although important in the recognition of heart disease, is likely to miss early disease and to be positive chiefly in advanced cases showing remarkable changes in cardiac contour or size.

A more detailed analysis of the findings in the total examination was completed in the cases of 554 consecutive examinees. Findings sufficient for diagnosis or important enough to warrant referral for further work-up appeared in 310 of the 544 cases. In this group, 245 positives resulted from history and physical examination, and 145 from laboratory test or special procedure. Only 80 of 245 positives by history and physical examination were also positive by laboratory test or special procedure. But of the 145 laboratory and special test positives, 80 were also detected by history and physical examination. By adding the 45 persons detected by height and weight and blood pressure determinations, the total in the group detected by laboratory techniques is raised to 190.

It is clear that the omission of history and physical examinations in the 310

cases would have reduced by over one-half the important conditions discovered, and this is particularly so in cancerous, precancerous and degenerative cardiovascular disease conditions which lead the list of causes of death. . . If screening procedures are applied to examinees without these means of detection of disease, and with any implication that the individual has been examined to exclude such disease, much harm may be done. Screening by the usual laboratory tests and chest plate, however, was extremely important in disease detection, although it left a "blind spot" in the investigation of certain important disabling and killing diseases.

Multiple screening examinations should be modified and set up to fit specific groups under consideration, based upon age, socio-economic status, geographic area, and other factors. It is important to develop effective screening procedures covering historical data and the items in physical diagnosis which are essential, and to find procedures which will substitute for these items as screening mechanisms.

Further study on screening levels is needed and the need for a method for simple mass application in detection of precancerous and cancerous lesions and for detection of early degenerative vascular disease is obvious.

Supreme Court Decisions

Two decisions of the U. S. Supreme Court bear on interstate coöperation in stream pollution control and in free interstate movement of milk.

The first deals with the legality of interstate stream pollution compacts. West Virginia, one of 8 states of the Ohio River Valley Water Sanitation Compact, refused to pay its pro rata share of the Compact budget on the ground that the state legislature had violated the state constitution by delegating police power contrary to the general principles of constitutional law and by requiring the state to incur financial obligations in violation of the debt limitation imposed by the West Virginia constitution. The U. S. Supreme Court reversed the action of the State Supreme Court of Appeals and found that the Compact "involves a reasonable and carefully limited delegation of power to an interstate agent. The Compact evidently was drawn with great care to meet the problem of debt limitation."

The second decision invalidates a Madison, Wis., local ordinance restricting sale of milk not pasteurized within 5 miles of the city center. The Court said that the ordinance "in practical effect excludes from distribution in Madison wholesome milk produced and pasteurized in Illinois. In thus erecting an economic barrier protecting a major local industry against competition from without the state, Madison plainly discriminates against interstate commerce."

Modern Methods in the Sampling of Human Populations

General Principles in the Selection of a Sample *

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SAMPLE surveys are being employed increasingly in public health research. When successful, they provide usable information about the characteristics of a large group of people quickly and moderately cheaply. They are particularly advantageous when highly trained personnel, limited in availability, are needed for some aspect of the study.

This paper discusses some of the principles involved in the selection of the sample. This is not always the most important or difficult part of a sample survey. But it is the part where persons inexperienced in sampling may feel least sure of their ground and most open to criticism by experts in sampling theory.

ERRORS IN SAMPLING

Any estimate made from a sample is subject to error. Although there are many sources from which error may arise, we can distinguish four broad groups.

1. Sampling errors
   a. Errors arising from the sample as selected
   b. Errors arising from non-response
2. Errors of measurement
3. Errors in the preparation of estimates
4. Errors due to the fact that the population characteristics change with time

The first group (sampling errors) is always present because we measure only a part of the population or universe. This category may be subdivided into two parts—errors arising from the sample as it was selected, and errors due to failure to measure the whole of the sample that was selected. As anyone who has conducted a sample survey will agree, it is no small task to obtain answers to all the questions from all the persons in the sample. The second group consists of errors of measurement, which face us whenever, for any reason, the answers recorded for some question are incorrect. Errors are also introduced (group 3) in the editing and tabulation of results and the preparation of estimates.

The fourth group requires some explanation. Samples are often taken, not in order to describe the present or past, but as a basis for future action. In considering whether to start a health program for a chronic disease, we might measure the incidence during the past year. What we really would like to know is the incidence in future years. Thus, even if a complete census is taken and the past year's incidence is known exactly, this figure still has an error for the purpose for which we want to use it, because incidence changes from year to year.

This classification brings out the point that the way in which the sample is selected will influence only one component, and not the whole, of the error. A survey may be ruined because of poor

* Presented before the Statistics Section of the American Public Health Association at the Seventy-eighth Annual Meeting in St. Louis, Mo., November 2, 1950.

selection of the sample, but it may also be ruined even if the sample has been very well selected. Constant attention to all stages of the operation is needed. Indeed, it is advisable to try to foresee at what point any projected survey will be most vulnerable. It may often pay to take a smaller sample than we had hoped, in order to have the resources to concentrate on the reduction of some other source of error, e.g., non-response or error of measurement. Finally, in the present paper the reader should bear in mind that my subsequent remarks refer in general to the error due to the sample as selected, rather than to the total error.

THE GUIDING PRINCIPLE

The principle that governs modern sampling practice is the familiar economic maxim that one should get the most for one's money. When considering various ways in which the sample might be drawn, we try to select that which will give the desired degree of precision as cheaply as possible. I shall describe some of the steps involved in an attempt to apply this principle.

THE SPECIFICATION OF PRECISION

The first question that must be answered is: how small do we want the sampling error to be? This, of course, is related to the question: how precise would we like the estimate to be? The question is usually answered by specifying the standard error σ which we wish the estimate to have. There are good theoretical reasons for expecting that most estimates in sample surveys will be approximately normally distributed. Thus, the chances are about 19 in 20 that the estimate will not differ from the true value for the universe by more than $2\ \sigma$, so that knowledge of the standard error permits us to compute limits of error for the estimate which we can be fairly confident are valid.

The specification of the standard error should be made by the persons who propose to use the results of the survey, and should depend on the precision needed for such use. There is often some arbitrariness and perhaps indecision in the specification, but it should be made as carefully as possible, because a demand for unnecessarily high precision involves a waste of resources, while poor precision diminishes the utility of the results.

In deciding the size of sampling error at which we will aim, account should also be taken of what is known about other sources of error. We might wish to estimate a morbidity rate correctly to within 4 per cent, and therefore choose a sampling standard error of 2 per cent. But perhaps the definition of this morbidity is so difficult and so little understood by the layman that even with a complete census the rate is unlikely to be correct to closer than 10 per cent. In this situation there is a case for increasing the desired sampling standard error, on the grounds that there is no point in having a very small sampling error if other errors will make the estimate imprecise.

SIZE OF SAMPLE

The next step is to estimate, for any sampling method that is under consideration, the size of sample that is needed to reduce the standard error of the estimate to the chosen amount. This process will be illustrated for a simple random sample. By this is meant a sample drawn by numbering all the units in the population, mixing the numbers thoroughly, and picking numbers in succession until the desired sample size is reached. If σ is the standard deviation for some measurement in the population, the standard error of the mean y from a simple random sample is known from theory to be

$$(1) \qquad \sigma_y = \frac{\sigma}{\sqrt{n}} \sqrt{1 - \frac{n}{N}}$$

where n and N are the sizes of the sam-

ple and population respectively. Equation (1) can be solved to provide n in terms of σ_y, the desired standard error for the sample mean.

Needless to say, this example oversimplifies the problem of determining sample size. There are nearly always a number of estimates to be made, each requiring a different sample size. Separate estimates may be wanted for different segments of the population, each with its specified limits of error. Further, the formula for σ_y changes with the method of sampling. A more extended discussion of the issues is given by Mr. Cornfield.*

Two points may be noted. If the calculation of n is to be feasible, we must have a formula which expresses the standard error of the estimate as a function of the sample size. The implications of this requirement will be discussed in a later section. Secondly, as is true for all methods of sampling, the formula for n involves the population standard deviation σ. This must be estimated, either from previous data, or from what it is hoped is an intelligent guess. For anyone who engages regularly in sampling, it is worth while to record any information about population standard deviations that becomes available from the results of sample surveys. Such data, which tend to be overlooked as uninteresting, may constitute the most valuable information that can be had for improving future sampling.

COSTS

At this point we are in a position to make some estimate of the cost of taking the sample. For an unfamiliar type of sampling some guesswork is usually involved, but with experience, accurate costing becomes easier. A common fault is to be too optimistic about field costs and to allow no margin for mistakes. It is sometimes taken for granted that the interviewer wastes no time in finding an address, and that as soon as a bell is rung, the door is opened by a housewife eager to answer questions but with no desire to make any irrelevant remarks. Costs involved in tabulating, summarizing, and interpreting the results are sometimes forgotten.

THE COMPARISON OF SAMPLING METHODS

When the cost of obtaining the desired degree of precision has been estimated for each sampling method that is under consideration, it remains only to select the method for which the cost appears likely to be least. Space does not permit a classification of the different methods of sampling, though some account of the principal devices will be given later. The number of methods that are operationally convenient for any particular survey is usually small. Further, by means of general rules developed from sampling theory, it is often possible to select the most economical of a whole group of sampling methods without detailed examination.

PROBABILITY SAMPLING

In the approach outlined above it is necessary to have, for any sampling method, a formula which gives the standard errors of estimates made from the sample. This formula is used to calculate sample sizes when the sample is being planned. When the survey is finished it provides standard errors for the estimates that have been made.

Sampling error formulae are available only for samples selected so that every unit in the population has a known probability of getting into the sample. The simple random sample satisfies this condition, for it gives every unit in the population an *equal* chance of being included in the sample. The phrase *probability sampling* is applied nowadays to denote this type of sample.

Some sampling techniques which have

* Cornfield, Jerome. The Determination of Sample Size. *A.J.P.H.* 41, 6:654-661 (June), 1951.

been widely used do not yield probability samples. This happens when the sampling is confined to an isolated segment of the population, or to those units in the population that are thought by someone to be especially "typical," or to those that happen to be particularly easy to measure. These methods often appear attractive, since they may accumulate a large body of data cheaply. They should be avoided except where their convenience definitely outweighs the disadvantage of having no clear idea of the precision of the estimates. Their use might be defended in exploratory work if the main object is to find out whether a particular study is operationally feasible at all.

THE FRAME

How do we draw a probability sample? Without resort to details, the general procedure is as follows. We need a subdivision of the population into sampling units. These units are numbered in some fashion, and the desired probability of inclusion is decided for each one. Then, usually with the aid of a book of random numbers, the draw is made so as to conform with the system of probabilities that has been assigned.

The drawing of a probability sample thus necessitates something equivalent to a listing of the sampling-units in the population. The word *frame* has been coined by the U. N. Subcommission on Sampling to denote this subdivision of the population. One of the first tasks in planning a sample is to find out whether a frame is already available. Sometimes this presents no difficulty, because there exists a listing of the population. But experience in sampling breeds a suspicious attitude toward lists. They are often found to be incomplete, or to involve duplication, or to contain inaccurate information, despite the most authoritative assurances to the contrary. Lists are, however, so convenient for sampling that it is worth while to make every effort to utilize them, after revision and completion, or with supplementary sampling to cover gaps in the list.

In the absence of a suitable frame, one must be constructed. This may be expensive and time-consuming, but by use of ingenuity it often proves less of a burden than had been anticipated. For instance, the sampling units into which the population is divided in the frame need not be the same as the units which we wish to measure (generally called the *units of observation*). For a sample of an urban population, the list need not consist of persons: it may be a list of households, or of city blocks. The paper by Mr. Hansen and Mr. Hurwitz* on the method of area sampling illustrates how such devices are applied to human populations.

In the following sections some of the commonest techniques used in probability sampling are briefly described.

STRUCTURE OF THE SAMPLING UNIT

The sampling unit is often an aggregate or cluster of the units of observation. Substantial savings are sometimes made in this way. For a given bulk of sample, i.e., a given number of completed questionnaires, a large sampling unit usually gives rather imprecise results because, speaking popularly, large units provide a rather "spotty" coverage of the population. On the other hand, a large unit usually enables a larger bulk of sample to be taken for the same cost, since travel and administrative costs tend both to be reduced. In a personal interview sample designed to cover the whole of the United States, a random sample of individuals, if it could be taken, would not be efficient, because too much time and money would go into traveling among individuals and too little into securing questionnaires. The county has been found fairly satisfactory as a

* Hansen, Morris H., and Hurwitz, William N. Some Methods of Area Sampling in a Local Community. *A.J.P.H.* 41, 6:662–668 (June), 1951.

sampling unit in such surveys. The general objective is to obtain by trial and error the most efficient balance between cheapness in field costs and statistical precision.

The structure of the unit also plays a part. If there is a choice, the unit should be set up so that there is the maximum variability *within* the unit. This automatically decreases the variability among units, which dominates the sampling error of the estimate.

TWO-STAGE SAMPLING

If the sampling unit consists of a cluster of the units of observation, we need not measure *all* the units of observation that belong to a chosen sampling unit. The sampling unit itself can be regarded as a little population, which is enumerated by drawing a sample from it. This process has been called *subsampling* or *two-stage* sampling, the latter name being appropriate because the sample is drawn in two steps. The first is to draw a sample of the clusters. The second is to take each cluster that comes into the sample, and draw a sample from it. This necessitates the construction of a frame within the cluster, and the definition of a secondary, or subsampling unit. The process can obviously be extended.

Thus, in a sample of the urban population of the United States, the county might be the primary unit. Within the county, the town might serve as a secondary or sub-unit, a sample of towns being drawn from each selected county. Within the town, the city block might be a sub-sub-unit, and within that the household might be the final unit.

One advantage of multi-stage sampling is that it gives more flexibility in the planning. The number of counties, the number of towns per county, the number of blocks per town, and the number of households per block in the sample are all at our disposal, and can be chosen in an attempt to minimize costs for a specified precision. A wise choice demands considerable knowledge both of the variability within the population and of the field costs. This emphasizes the value of keeping such records whenever the opportunity occurs.

STRATIFICATION

A very common device is to divide the population into sub-populations or *strata*. There may be several reasons for this. Sometimes statistics are to be published separately for each stratum, so that it is convenient to keep the corresponding samples separate. Sometimes different strata present quite different field problems that are best handled independently, as for example a stratum comprised of prisons versus one comprised of private homes.

Even when these reasons do not apply, stratification may produce an increase in precision. This occurs when we are able to form strata such that each stratum is homogeneous internally, although one stratum may differ markedly from another. The exact size of each stratum (i.e., the number of sampling units which it contains) must also be known. A sample is taken independently in each stratum. If the stratum is homogeneous, the sample mean should be close to the corresponding stratum mean. Since the sizes of the strata are known, the sample mean from each stratum can be given its proper weight in estimating a mean for the whole population.

The sampling rate (i.e., the proportion of units that are selected) may be varied from one stratum to another, with the possibility of a further increase in precision, which is sometimes large. Formulae giving optimum rates have been worked out for a variety of situations. Suppose, for example, that the cost of taking the sample can be represented by the simple formula

$$\text{Cost} = \Sigma\, c_i\, n_i$$

where c_i is the cost per sampling unit in the ith stratum and n_i the number of units sampled in that stratum. The optimum rate, n_i/N_i for the ith stratum, is found to be proportional to $\sigma_i/\sqrt{c_i}$, where σ_i is the standard deviation within the stratum. In other words, it pays to increase the sampling rate within a stratum if the stratum is highly variable, or unusually cheap to sample. The result presupposes random sampling within each stratum. A sample of this kind illustrates a probability sample in which each unit does not have the same probability of inclusion, though all units within the same stratum do so.

SIMPLE RANDOM AND SYSTEMATIC SAMPLING

For the final operation of drawing the sample from a stratum, or the subsample from a primary unit, one of two methods is commonly employed. The first is to take a simple random sample, which has already been described.

Alternatively, having numbered the units, we may sample at a rate 1 in k by drawing a random number r between 1 and k, and selecting the rth unit and every kth unit thereafter until the end of the list is reached. Thus, if a part of the population contains 33 units, to be sampled at a 20 per cent, or 1 in 5, rate, we select a random number between 1 and 5, say 2. The sample consists of the units numbered 2, 7, 12, 17, 22, 27, and 32.

This type of sample, called a *systematic* sample, is easier to select than a simple random sample, particularly if the drawing must be done in the field. It is likely to be more accurate, if there is a trend in the measurements which follows the order of numbering. Like the random sample, it gives every unit the same probability of inclusion. The chief defect of a systematic sample is that one cannot obtain from its results any formula of general validity for the sampling error of the estimate. Various approximations which are usually overestimates are available.

This account of the techniques which lead to economical sampling is scanty and incomplete. The drawing of units with probabilities proportional to their sizes, and the choice of an efficient method of estimation are additional devices which deserve study. Recent books by Yates [1] and Deming [2] give an extensive discussion of the subject, with numerous illustrations.

THE PROBLEM OF NON-RESPONSE

In conclusion, it may be appropriate to mention the problem of non-response, because failure to collect the data obviously nullifies at least part of the skill and effort devoted to the selection of the sample. Moreover, in sampling human populations the problem almost invariably turns up. Some of the interviewees are difficult to contact: others are unable or unwilling to give information. This is particularly so in surveys where the data desired are technical or troublesome.

Unfortunately, any sizable percentage of non-response makes the results open to question by anyone who cares to do so. Suppose that our field methods, if applied to the complete population, would fail to get information from 20 per cent of the population. Then we really know nothing about, say, an incidence rate in that part of the population, except that it lies between zero and 100 per cent. We may believe and assert that the rate cannot differ much from the rate in the part of the population which we were able to sample, but such assertions are unsubstantiated opinions instead of facts. One sometimes reads that non-response has been "allowed for" by substituting other individuals for those who were hard to find or noncoöperative. Substitutions rarely solve the problem. They merely increase the size of sample in that part of the population which is amenable to our field methods.

Persons new to sampling often neglect to make any plans for dealing with non-response, apparently assuming that it will be negligible. There is some excuse for this, since it is difficult to foresee how much non-response will be encountered. However, ability to cope with unexpected contingencies is a very important asset in sampling, because, with all due respect to the theory of probability, some unexpected contingencies are certain to occur.

If the non-response is due to difficulty in contacting the respondent or to unwillingness to coöperate, one attack is to concentrate on a random subsample of the cases, making every effort to obtain the data from them. Methods for calculating the best size for this subsample have been given by Hansen and Hurwitz; [3] see also Birnbaum and Sirken.[4] If the trouble lies in inability to give the information, a change in the questionnaire and type of approach is indicated. Sometimes there is no remedy, the fact being that people do not possess the information that we had hoped to get. Even in this case it is well to become aware of it early rather than late.

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Revised List of Essential Services

Early in April a revised List of Essential Activities was issued by Secretary of Commerce Charles Sawyer for the guidance of the Defense Department in scheduling calls on reservists to active duty, and for the information of Selective Service in determinining draft deferments.

The classification as related to health and medical care services in the former listing was discussed in this *Journal* in November, 1950. The revised listing dealing with similar matters is numbered 24 in a series of 25. It reads "Health and Welfare Services—Personal medical, dental, and nursing services; hospitals; public health services; biological services in food processing."

The fact that this listing fails to mention any welfare services has been called to the attention of the authors.

Item 25 of the new listing, also with some relevance to public health, reads "Educational and Research Services—Educational (college and vocational) activities which contribute directly to the national health, safety or interest; research and development projects of direct concern to health, welfare, and the defense program."

Modern Methods in the Sampling of Human Populations

The Determination of Sample Size *

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IN the early stages of planning a sample survey one is ordinarily concerned with two different sets of questions, both relating to the survey's feasibility. First of all one is concerned with the possibility of obtaining the required information from the type of respondent considered. Thus, if the subject under investigation is the prevalence rate of certain ailments in the general population, one class of questions relates to whether such information would or could be supplied by individuals or by doctors, whether a suitable questionnaire could be devised, and the like.

A second class of questions relates to economic feasibility. Assuming that a class of respondent can be found who can supply accurate information of the type required, does one have sufficient resources—funds, personnel, time—to survey a sufficient number of respondents to yield results of desired precision? To a considerable extent, questions of economic feasibility are answered if one knows how large a sample of respondents is required. In consequence an initial approximate determination of sample size is one of the early steps in the planning of a survey. We propose to illustrate some of the factors involved by consideration of a specific survey.

As is well known, the Public Health Service has been sponsoring a nationwide program of mass chest x-rays. The primary purpose of this program is, of course, not statistical. As a by-product of the program, however, a mass of data has become available which appears to offer the possibility of determining the prevalence of tuberculosis in the adult population. The data available, however, cover only persons who volunteered for chest x-rays, and from many points of view may not be generally representative. In fact, comparisons of the ages of the volunteers with those of the general population discloses systematic differences. For this reason the Division of Tuberculosis Control has considered the possibility of selecting a representative sample of adults who have not volunteered and by obtaining x-rays from them estimating prevalence rates for the entire population. It was therefore proposed to undertake such an investigation in Cleveland, where a mass chest x-ray program was to be initiated. Two types of estimates were to be prepared: the proportion of different segments of the population volunteering for x-rays, i.e., coverage rates, and estimates of the prevalence rate of tuberculosis among the non-volunteers. The question posed was how large a sample of non-volunteers was required.

In this form the question of course is not specific enough to be answered. The first step then involves finding a way to ask the question in such a form

* Presented before the Statistics Section of the American Public Health Association at the Seventy-eighth Annual Meeting in St. Louis, Mo., November 2, 1950.

that it can be. If we concentrate initially on the estimate of the prevalence rate, we must first of all specify the precision with which we wish to estimate this quantity. What one would like to do is to define this precision in terms of a maximum permissible error. Actually there is always some probability that one will draw a sample with an error larger than any prespecified amount. In practice, therefore, one must specify both a maximum permissible error and the chance of exceeding it that one is willing to take. Thus, one might desire a sample so large that the probability of obtaining an estimate of the rate of tuberculosis prevalence among non-volunteers in error by 20 per cent or more of the true value is 5 in 100. Or, one might specify a maximum error of 10 per cent or 5 per cent with a probability of 2 in 100 or 3 in 100 of exceeding it. The actual choice of an error and a probability is not entirely a statistical decision since it depends at least in part on a consideration of the reasons for collecting the data and the uses to which they will be put. In the case of the tuberculosis survey, such subject matter considerations indicated a maximum error of 20 per cent of the true value for the non-volunteers with a probability of exceeding it of .05.

This formulation has defined error as sampling error. In evaluating survey results one must, of course, consider other sources of error as well, such as response errors. It is appropriate to neglect them in considering sample size, however, since they cannot be controlled by merely increasing the size of the sample. These other sources of error must be kept in mind, however, in defining a permissible size of sampling error. It would be fruitless, for example, to plan for a very low error of sampling when response errors will remain high.

Once this first step is taken we may proceed to the consideration of sample size by making two assumptions:

1. That the estimate of the rate of tuberculosis prevalence is normally distributed in successive samples from the same population.
2. That the basic unit of sampling is the individual.

The first assumption introduces no difficulty but the second will be reconsidered at a later point. If we denote by ϵ the maximum permissible error, by $\sigma\ (p')$ the standard error of the estimate of the tuberculosis prevalence rate, p′, supplied by the sample, and by α the specified probability of exceeding the permissible error, the first assumption permits us to write

$$(1) \qquad t_\alpha\, \sigma\ (p') = \epsilon,$$

where t_α is the normal deviate corresponding to the probability α. Thus, if $\alpha = .05$, $t_\alpha = 1.96$; if $\alpha = .01$, $t_\alpha = 2.58$, i.e., we set a certain multiple of $\sigma\ (p')$ equal to the allowable error. The second assumption permits us to write

$$(2) \qquad \sigma\ (p') = \sqrt{\frac{pq}{n}},$$

where p is the unknown true prevalence rate, $q = 1 - p$ and n is the sample size to be determined. In that case equations (1) and (2) together yield a simple equation expressing the desired sample size as a function of the desired precision and the true prevalence rate

$$(3) \qquad n = \frac{t_\alpha^2\, pq}{\epsilon^2}.$$

The specification of the required precision has set ϵ equal to .2p and t_α approximately equal to 2. The sample size, n, then becomes $100\frac{q}{p}$.

Thus, to compute the sample size required we must know beforehand the true prevalence rate, of which the sample when selected, interviewed and tabulated will at best yield an estimate. At first sight this result appears nonsensical, and what is perhaps worse, useless. A little

reflection will show, however, that of necessity the sample size required must depend on the true rate. If the rate in the population were very high, a small sample would clearly be quite accurate. If the true rate were 100 per cent, a sample of size one would infallibly supply the correct estimate. On the other hand, if the rate were very low most small sized samples would include no individuals with tuberculosis and would consequently supply an estimate of zero incidence, an estimate with 100 per cent error.

Furthermore, one rarely, if ever, undertakes a sample survey without some general knowledge of the magnitudes to be estimated. There are always at least some fragments of information available, *a priori* or qualitative knowledge, surveys made by other investigators and the like. Thus, mass chest x-rays made in other cities suggested that if the non-volunteers do not differ from the volunteers, p might be taken as approximately equal to .01. If this estimate is inserted in (3) we obtain a required sample size of 9,900.

If this initial estimate eventually turned out to be correct, the sample size would yield answers of the desired precision. If the true prevalence rate were in fact higher, the sample would have yielded a more precise result than desired. Thus, if p were in fact .02, a sample of 9,900 would have a probability of .05 of being in error by more than 14 per cent, rather than the desired 20. If p were in fact .005 the error would be 28 per cent rather than 20. These calculations illustrate that while the actual precision attained depends to some extent on the initial value of p assumed, the dependence may be of no great practical importance. If the value to be estimated by the sample is one-half what we suspect it to be, the fact that the error may be as large as 28 per cent rather than the desired 20 may not be serious. When the sample returns are in, an estimate of the actual sampling variance is, of course, in no way affected by the initial estimate of p used. It has served its purpose and now disappears from sight.*

EFFECT OF BREAKDOWNS

Up to this point we have assumed that the proposed survey, whose size is now beginning to assume formidable dimensions, is to yield a single number, p, the tuberculosis prevalence rate in the non-volunteer population in Cleveland. Aside from estimates of the coverage rate for different segments of the population whose effect has yet to be considered, we must also allow for the fact that the prevalence rate was to be studied in detail. It is obviously of some importance to know not only the prevalence rate among non-volunteers, but also the extent to which it is affected by economic level. In consequence it was hoped to group sample individuals into census

* In the foregoing calculations we have assumed that the function of the sample is to provide an estimate of the prevalence rate with a sampling error of 20 per cent. It follows that if we wish to determine whether the *sample* prevalence rate differs from a postulated rate of .01, we shall declare it significant whenever it differs from .01 by 20 per cent or more. Had we been interested in selecting a sample so large that when the *population* prevalence rate differs from .01 by 20 per cent we should with high probability have declared the sample difference, *whatever it is*, significantly different from .01, then the present sample might not be large enough. For if the population difference from .01 were 20 per cent, the probability of drawing a sample of 9900 which differs from .01 by less than 20 per cent is .5. The chance of declaring the sample difference significant is thus .5. If we wish a higher probability than that, say, β, the appropriate sample size would be given, not by (3), but by

$$(4)\quad n = \frac{(t_\alpha + t_\beta)^2\, pq}{\epsilon^2},$$

where t_β is the normal deviate corresponding to a probability of 2 $(1-\beta)$ of being outside the limits $\pm t_\beta$.

tracts of differing economic levels and to estimate p for each of them. If the grouping were such as to include approximately equal numbers of adults, and an estimate were required for each group of the same precision specified for the overall sample, then we should require a sample of 9,900 for each such grouping. With census tracts grouped into five equally populated economic levels this would imply an overall sample of 49,500 adults. If on the other hand an overall sample size of 9,900 were retained, the error in the estimate for any one group would be increased to $\sqrt{5}$ x 20 per cent or about 45 per cent.

Another breakdown of the sample results of interest was the comparison of rates among the white and colored populations. In Cleveland approximately 10 per cent of the 1940 population was colored so that approximately 990 of the sample of 9,900 non-volunteers might be expected to be colored. A simple calculation showed that comparison of the prevalence rate of the 990 colored adults with the 8,910 whites would declare a sample difference of 70 per cent or more in prevalence rate significant, while the more meaningful comparison with the 10 per cent of the white adults at the lowest economic level would detect a sample difference of 84 per cent.

In consequence it was clear that while a sample of 9,900 might yield a sufficiently accurate estimate of the overall prevalence rate, it would support very little by way of a useful breakdown.

Before reconsidering sample size in the light of this conclusion it is desirable to turn to the estimate of coverage rates. Let us consider a particular segment of the population, say white males, aged 30–40, living in the upper fifth with respect to economic level. Persons with these characteristics will constitute a certain percentage of the volunteer population, say p_V, and possibly a different percentage, say p_N, of the non-volunteers. Denote the proportion of the general population covered by the chest x-ray program by P. From past experience this was expected to be about .6. The algebraic expression for the coverage rate, for this segment, denoted by r is then

$$(5) \quad r = Pp_V/[Pp_V + (1 - P)\, p_N],$$

which of course reduces to P when $p_V = p_N$. The standard error of the sample estimate of this quantity, when the individual is the sampling unit, can be shown to be given approximately by

$$(6)\ \sigma(r') = r(1 - r)\sqrt{\frac{q_N}{p_N\, n}}.$$

Proceeding as before, we obtain as the overall sample size required to estimate the coverage rate r, for a segment containing proportion p_N of the non-volunteer population, with probability α of being in error by more than ϵ,

$$(7) \quad n = t_\alpha^2\, r^2\, (1 - r)^2\, \frac{q_N}{p_N\, \epsilon^2}.$$

If we set $\epsilon = .1r$, i.e., a 10-per cent error, a true r assumed equal to .5 and $\alpha = .05$, $n = \dfrac{100\, q_N}{p_N}$. The sample size required for this phase of the survey thus depends on p_N, the size of the segment for which we wish to estimate the coverage rate. If we wish to estimate it for a segment constituting one-half the non-volunteer population, n = 100; for one constituting one-tenth the non-volunteer population, i.e., colored adults, n = 900; for one constituting only 1 per cent of the population, i.e., white males, aged 30–40, living in the upper fifth with respect to economic level n = 9,900. It thus appears that estimates of the coverage rate can be made for fairly small segments of the population with an error of 10 per cent or less without requiring a sample size greater than that required to estimate the overall prevalence rate.

There is more to this than meets the

eye, however. Let us suppose that we estimate coverage rates from an overall sample of 9,900 broken down into 100 separate segments each including 1 per cent of the non-volunteer population. This means that any one estimate will have probability .05 of being in error by more than 10 per cent. Since there are 100 independent estimates, we consequently expect that on an average a sample of this size will yield estimates of coverage rates which are in error by more than 10 per cent for 5 of these segments. This means that with 100 independent breakdowns we can look forward to several of them yielding estimates in error by more than the prespecified amount. Unfortunately there is no way of knowing, either before or after the sample is drawn, which they are.

We might reasonably desire a sample size so large, however, that the poorest of the 100 estimates has a small probability, say, .05, of being in error by more than 10 per cent. In that case the probability, a, that at least one is in error by this amount or more is given by the equation

$$(8) \qquad 1 - (1 - a)^{100} = .05.$$

Solving we obtain a equal to .0005, and t_a equal to 3.48. To meet this requirement sample size must therefore be increased by the factor $(3.48/2.00)^2$ or more than three-fold. This yields a sample size of approximately 30,000.

In short, a sample of 10,000 is sufficient to yield an estimate of overall prevalence rates, but appears too small when consideration is given to the different possible breakdowns that might be required. Formally this introduces no difficulty since we need merely specify the precision required on the finest breakdown and calculate the sample size required. In practice the answer obtained makes one reconsider the necessity of such a fine breakdown. A process of mutual reconciliation of the desire for detailed breakdowns with the large sample sizes they imply, led to a compromise sample size of 20,000. This would yield an excellent estimate of the overall prevalence rate and good estimates of the coverage rate for a large number of different segments, and only fair estimates of the prevalence rate for a restricted number of segments.

SIZE OF POPULATION

Up to this point no explicit account has been taken of the size of the population sampled. Several issues are involved here. A sample of 20,000 non-volunteers would include about every twelfth non-volunteer in Cleveland. A naive, but natural question, that arises is why not select a smaller city than Cleveland and cover one-twelfth of the non-volunteer adults there. This would clearly reduce total sample size and preserve the sampling ratio. Unhappily, keeping the sampling ratio constant does not keep the sampling error constant. Had we taken account of the finite size of the population in the preceding calculations, the necessary sample size previously derived would be reduced by approximately one-twelfth, i.e., from 20,000 to approximately 18,300. On the other hand, if we selected a city of say half the size of Cleveland, a sample of 20,000 would cover every sixth adult and the necessary sample size would be reduced by approximately one-sixth, to 16,600. Cutting the size of the population by half in this case results in reducing sample size required for the same accuracy not by half, but by about 10 per cent. Generally, when the proportion of a population sampled is 10 per cent or less, the effect of population size on sample size is not large and will introduce no serious errors if disregarded.

There is a more fundamental consideration, however. Most members of the Statistics Section have had occasion, I am sure, to inspect mortality rates for

an infrequent cause of death for small areas. These, of course, vary from year to year, so that no one is surprised or concerned if a county of 10,000 shows two deaths from a specific cause in one year and four deaths the following year. Even though the calculated rates are based on complete enumerations we regard them as still subject to some type of random variation.

The same reasoning seemed applicable to the proposed survey. If mass x-rays were conducted in two successive years, we should not expect all the people who volunteered in the first year to volunteer again, nor should we expect all the non-volunteers to abstain again. In consequence, even complete enumerations of non-volunteers in successive years would show somewhat different prevalence rates. Our interest was not in obtaining an inventory of the non-volunteers for a particular year. In fact we should regard the prevalence rate obtained by completely enumerating all 240,000 non-volunteers as subject to at least the error to be expected from a random sample of this size from an indefinitely large population. Similarly, a complete enumeration of all the adults in a county of 10,000 would yield less precise results than a sample of every twelfth adult in Cleveland. Disregarding population size consequently seemed not merely a sufficiently good approximation but a necessary consequence of the problem.

EFFECT OF SIZE OF SAMPLING UNIT

It is now necessary to reëxamine the assumption that the individual is the unit of sampling. Empirically this implies that we have a sampling procedure which is the equivalent of selecting at random the names of 20,000 adults from a list containing the names of all non-volunteers in Cleveland. Actually, no such list existed. Even if it did, however, the wisdom of using it would be questionable. Using such a list, we should have obtained 20,000 names scattered throughout Cleveland. Covering such a geographically dispersed sample would involve heavy administrative costs, particularly if each sampled non-volunteer were to be examined in a mobile x-ray unit.

An alternative procedure, which would clearly reduce the total cost of travel would involve grouping the population into clusters composed of more than one individual. Such clusters might consist of all adults in a household or all adults in a single residential structure, or in a single city block or perhaps in an even larger unit. The sample would then be a sample of such clusters. It is clear that some such clustering would be administratively desirable. It is also clear that it might affect the efficiency of the sample. If the magnitude measured were say the prevalence of venereal disease rather than tuberculosis, and the cluster were the household, little additional information might be obtained from investigating the second spouse in each household. A similar, although not equally large, loss in efficiency might be expected in a study of tuberculosis. Thus, on the basis of cost considerations alone we were led to a cluster of large size, whereas on the basis of efficiency considerations alone we are led to a cluster of one. If we attempt to select that cluster which yields minimum error for a fixed total cost, qualitatively we can state that the cluster size would be greater than one. How much greater would depend on the interaction between two functions, neither of which we know: the relationship of cost and of sampling error to cluster size. Both relationships depend on the particular quantity being measured and cannot be deduced theoretically.

It nevertheless seemed necessary to explore the loss in efficiency that the use of a larger size of unit might entail.

The only information available was data on the tuberculosis case rate in

Cleveland by census tract in March, 1949. If all tracts were of the same size, say $\overline{N}$, and a sample of m tracts out of a total of M were selected, the standard error of the estimated prevalence rate would be

$$(9) \quad \sqrt{\frac{1}{m}\,\frac{1}{M}\sum_{i=1}^{M}(p_i-\overline{p})^2},$$

where p_i is the prevalence rate in the i^{th} tract, and $\overline{p}$ is the average over all tracts. If there were no loss in efficiency in using the tract rather than the individual as the sampling unit, this would be numerically equal to

$$(10) \quad \sqrt{\frac{\overline{p}\,\overline{q}}{m\,\overline{N}}}.$$

In consequence the ratio

$$(11) \quad \frac{\overline{p}\,\overline{q}}{m\,\overline{N}} \Big/ \frac{\sum(p_i-\overline{p})^2}{m\,M}$$

is a measure of the efficiency of the tract as a sampling unit. Its reciprocal supplies a measure of the factor by which sample size, estimated by assuming that the individual is the sampling unit, must be increased if the tract is in fact the unit. In practice this formula must be modified to make allowance for the fact that tracts are of unequal size. The modified formula for the factor is

$$(12) \quad \frac{1}{M}\sum_{i=1}^{M}\frac{N_i^2(p_i-\overline{p})^2}{\overline{N}\,\overline{p}\,\overline{q}},$$

where N_i is size of the i^{th} tract. On calculation using the data that were available by census tract this was found to be 7.4. Thus, if the tract were used as the sampling unit a sample 7.4 times as large as 20,000 or 148,000 adults would be required.

This result suggested that even when a sampling unit considerably smaller than the tract is used, a serious but unspecified loss in efficiency is to be expected. In general, we should expect that as the size of sampling unit is decreased the loss in efficiency will be less pronounced. Several attempts have been made to describe empirically the manner in which efficiency decreases as the size of the sampling unit increases, although none appears completely general. One relation that has been successfully applied in agriculture assumes that efficiency as a function of the size of the sampling unit, $\overline{N}$, is given by

$$(13) \quad \log E = -b \log \overline{N}.$$

If this relationship is used, we may calculate that if a cluster of 4,600, the average size of a census tract, requires 7.4 times as many individuals as a cluster of one, then a cluster of 150, the average size of a city block, would require 3.3 times as many. The use of a cluster of 100 would require 3 times as many; of a cluster of 50, 2.5 times as many; of a cluster of 20, twice as many. In short, cluster sizes varying from 20 to 150 would entail a two to threefold increase in sample size.

To check on the applicability of the formula used, we calculated the efficiency of both the block and the tract as the sampling unit for several census characteristics. When these were plotted on double-log paper, the actual block efficiency as computed lay above the straight line connecting actual tract efficiency with the theoretical efficiency of unity for a cluster size of one. Formula (11) as used thus appears to underestimate the efficiency of the smaller sized clusters. In consequence the factors derived appeared to be too high. As a final estimate of the factor by which sample size should be increased if a cluster of size somewhat smaller than the block were used, we took 2. This yielded a required sample size of 40,000.

SUMMARY AND CONCLUSIONS

We may recapitulate the factors which led to a final figure of 40,000 without much difficulty. To estimate the prevalence of a characteristic affecting 1 per cent of the population required a sample of approximately 10,000. A consideration of the breakdowns needed led to a doubling of this figure and a consideration of size of sampling unit to another doubling. The larger size of the sample is thus due mainly to the infrequence of the major characteristic being investigated. Had we been concerned with a characteristic occurring in 5 per cent of the population we should, *ceteris paribus*, have required only one-fifth as large a sample. The major conclusion of the analysis, therefore, was that the investigation of as infrequent a characteristic as tuberculosis required an extremely large sample. The final step was an administrative one: to determine whether the resources were available to conduct the investigation and, if so, whether the information was worth the expenditures that would be necessary. If not, some other approach would have to be found.

The range of problems encountered in this particular survey is fairly typical. The emphasis will of course vary from one survey to another and in some cases issues not touched on here will assume importance. Two things will remain invariant: the necessity for the joint use of theoretical and subject matter considerations, and the necessity for a careful and systematic formulation of the objectives of the survey.

Schools of Public Health Elect

The Association of Schools of Public Health met in Baltimore, April 11 and 12 and considered among other matters the Report on Public Health in the Defense Program prepared by an American Public Health Association committee of which Harry S. Mustard, M.D., is chairman. The Association of Schools of Public Health voted to endorse this A.P.H.A. report as a contribution to the defense effort.

New officers of the association include:

President: Gaylord W. Anderson, M.D., Dr.P.H., University of Minnesota
Vice-President: Edward G. McGavran, M.D., M.P.H., University of North Carolina
Secretary-Treasurer: Ira V. Hiscock, Sc.D., Yale University

Modern Methods in the Sampling of Human Populations

Some Methods of Area Sampling in a Local Community *

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THE problem of good sample survey design is to achieve maximum reliability of results per unit of cost, and certain principles of optimum design guide one in accomplishing this. There are some fundamentals as to objectives that we shall assume: in particular—that a random or probability sample is desired, making it possible to make sample estimates not subject to personal bias, and also making it possible to evaluate the sampling error of those estimates.

Suppose the problem is to take a population or dwelling unit sample of a city, metropolitan area, or other local community when there is no reasonably adequate or up-to-date list of people, heads of families, or dwelling units for the city, from which to draw the sample. For example, the problem might be to estimate the proportions of persons having a particular illness, income, attitude, or other personal or family characteristic. The methods here outlined, can be applied to produce results of any desired precision by taking a large enough sample, even where no census of the population under consideration has ever been taken.

Even in the circumstance that very little material is available to use as a basis for drawing a sample, the selection of a probability (or random) sample can be relatively simple. It is not essential to have a great deal of information or to introduce complicated processes in order to obtain a random sample of persons or dwelling units. The use of more complex processes may be desirable, however, in order to increase the precision of sample results at a given cost.

Let us consider first a very simple method. We might have only a reasonably up-to-date map of the city which shows the street boundaries. The city map might be a published map, or an aerial photograph, or a sketch of the block boundaries within the city. The only requirement is that the map be of an accuracy sufficient to permit the identification of individual blocks or other small areas and the numbering and sampling of these blocks, and to permit field workers to locate exactly the areas that are selected.

To obtain a random sample of dwellings or persons one need only take a random sample of blocks and then take a census of the selected blocks. The steps are:

1. Number the blocks serially. The blocks may be numbered in any convenient sequence throughout the city, although there will be some advantage in numbering them in a geographic sequence in order to achieve some geographic "stratification" in the selection of the sample.
2. Determine the size of sample required. Of course, the size of sample needed will depend on the accuracy required as well as on the method of sampling. The expected accuracy of results with a given method of sampling and

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size of sample can be approximated in advance of drawing the sample. Let us assume for simplicity that it has been determined that for the design under consideration a sample of 500 blocks will yield estimates of the various desired characteristics of the population with the required reliability.

3. Draw the sample of blocks. If there are, say, 5,200 blocks in the city a sample of 500 blocks can be obtained by including in the sample 1 block in 10.4. To do this, choose from a table of random numbers a random number between 1 and 104, and divide the number obtained by 10. Record this number, and successively add 10.4 to it, recording each result. Then round the resulting series of numbers to the nearest whole numbers, and include in the sample the blocks having these numbers. Thus, if 17 is the random number found, this divided by 10 becomes 1.7. The series of numbers then will be:

	Before Rounding	*Rounded*
	1.7	2
(1.7 + 10.4) =	12.1	12
(12.1 + 10.4) =	22.5	22

etc.

4. A census of the selected 500 blocks is then taken, and the desired information collected. The census will yield for the sample blocks both the total number of persons and the number of persons having some specified characteristic in the sample blocks, along with other desired information. An estimate of the proportion having the characteristic can then be obtained by computing the ratio of these two numbers from the sample.

The above very simple procedure will yield results of measurable accuracy, since in this particular instance each individual in the population has a known chance of being included in the sample. However, this procedure usually will not be the best one for dealing with the problem. There are methods of modifying the sampling procedure which will ordinarily yield the required information from the sample at considerably less cost.

A simple and inexpensive modification of the procedure for drawing the sample would be to introduce additional stratification in connection with the selection of the blocks. Often there are fairly wide differences in some of the characteristics of persons living in different sections of the city and a geographical stratification will reduce the effect of these differences on the sampling error.

As has been suggested above, such stratification is made effective if the blocks are numbered in geographic order, section by section, throughout the city. This method of numbering often will be the easiest way to number them. With the blocks so numbered, stratification is accomplished by the systematic random sample selection already described.

THE USE OF ADDITIONAL STRATIFICATION

A second and perhaps more important use of stratification is to identify by inquiry, in advance of drawing the sample, those blocks that have very large aggregate populations, say, blocks having more than approximately 50 dwelling units. It is particularly important to identify large blocks with unusual characteristics, such as those with large hotels, lodging houses, hospitals, jails, military establishments, etc. The large blocks can then be sampled separately from the other blocks of the city. The work of identifying these special types of blocks can be facilitated by consulting city officials, the fire department, the police, postal employees, and other informed local groups. One can thus make use of an available resource in the form of the existing knowledge of various people in the community.

It is not necessary to obtain an accurate identification of this group of large blocks in accordance with some rigid definition of "large" blocks. If we fail to include certain large blocks in the group, the sample of the remaining blocks will still reflect their contribution to the average or total, but the reliability of the sample result will be lower than if they were all correctly classified beforehand.

Other criteria of stratification might be used in addition to the two (geography and size of block) that have been discussed. The investigator should

recognize, however, that extensive additional stratification, beyond introducing some of the fairly obvious criteria that may be readily available, is not likely to produce a substantial increase in precision in the estimates of general population characteristics, such as distributions by age, sex, and other classes. Moreover, any of a number of different stratification procedures may be equally effective, so that it is usually not worth while to debate extensively the comparative merits of competing methods of stratification.

USE OF SMALLER SAMPLING UNITS

We can obtain a better estimate for a given size sample by scattering the sample more widely. This could be accomplished by using half-blocks or segments of blocks as the sampling unit, and taking twice as many, or by otherwise decreasing the average size of areas in the sample and increasing the number. Some statistical theory is available to guide one in determining the optimum size of segment to be used. The gains by this line of approach may be very substantial, but often with the resources available, it is not feasible to designate a sample consisting of segments of blocks. In such a method of sampling it is necessary to subdivide into segments only the blocks that fall into the sample.

USE OF SUBSAMPLING

There are a number of ways other than subdividing the blocks which make it possible to have a larger number of blocks represented in the sample without increasing the number of families to be interviewed. One way is to select a larger sample of blocks and then to introduce a second stage of sampling within the selected blocks. This second stage of sampling is commonly referred to as subsampling. In a subsampling procedure one may list all the dwellings or other units to be subsampled in the sample of blocks, and select for interviewing a sample of the units listed. Thus, if a sample of 10 per cent of the persons is desired, one might select every fifth block and interview the persons living at every other address or dwelling within the selected blocks. As was indicated earlier, a 10 per cent sample of addresses or dwellings drawn in this manner gives considerably more reliable results than would a 10 per cent sample of blocks completely enumerated. It will also be more costly, but if the total size of such a sample is reduced to a size that gives equivalent cost, the results usually will be more reliable.

When such a subsampling procedure is used one must keep the method of listing the units within the sample blocks as simple and economical as possible. In determining the kind of subsampling units to be listed one need only remember that they should be readily identifiable, that they should be small, and that every person in the block must live in one of the listed units. For example, it is satisfactory to list dwellings and to interview all persons living at a sample of these dwellings provided that the dwellings listed are not too large (that is, do not contain except in rare instances more than 30 or 40 persons). Apartments within structures containing (or appearing to contain), say, 3 or more apartments should be separately listed. Within institutions and large lodging houses the unit of listing may be either a person or a room, whichever is easier to identify and list. If rooms are listed, the occupants of the rooms selected for the sample will be covered.

The "best" or optimum determination of the proportion of blocks to be drawn into the sample from the various strata and the subsampling ratios to be used in the selected blocks is given by available sampling theory. The optimum ratios will depend on the relative costs of various operations, and on the amount of variability in the characteristics being observed from block to block

(which is spoken of as "between-block variation") and from one listing unit to another within blocks ("within-block variation"). If there is a relatively large variation between blocks in the characteristics being estimated, then, as one might expect intuitively, the theory points to the use of a larger proportion of blocks and a smaller subsampling ratio than would be needed if the variation between blocks is relatively small.

The optimum allocation of sampling between and within blocks has an important implication for sampling from the stratum of large blocks that has been discussed. The variation from block to block of the total number of persons having various characteristics ordinarily will be relatively great for the large blocks. It follows that the proportion of such blocks included in the sample should be larger than the proportion included from the remaining blocks.

While statistical theory guides us in determining the optimum block sampling ratios and subsampling ratios, it is not usually feasible or necessary to adhere rigidly to such optimum ratios. One may depart moderately from the optimum values without significantly increasing the cost or the sampling error. Hence, the investigator has considerable latitude in selecting block sampling ratios and subsampling ratios so as to simplify the operations and processing of the sample. One such simplification that is satisfactory in most population samples for estimating multiple characteristics, as well as for many individual characteristics that are widely dispersed, is to impose the condition that the results of the sample be self-weighting; that is, that the estimate of the proportion of sick persons, for example, be simply the ratio of the number of sick persons in the sample to the total number of persons in the sample. This is accomplished by making the product of the block sampling ratio and the subsampling ratio the same for the special group of large blocks as for the other blocks.

The fact that it is not necessary to adhere rigidly to the optimum ratios in order to achieve most or a substantial part of the gains that may result from the application of the optimum theory means that some simple rules for drawing a block sample for a city can be given that have fairly wide applicability. Thus, an approximation to the optimum sampling ratios will often be accomplished by merely

a. using a uniform overall sampling ratio in all strata;
b. determining the block sampling ratio and the subsampling ratio in the stratum of "small-blocks" as follows: for problems in which homogeneity within blocks is not high, take a subsampling ratio such that on the average about five families will be included per sample block; if there is great homogeneity within blocks, take somewhat fewer families—say 1 to 3—per sample block; and
c. making the proportion of blocks to be drawn from the "large-block" stratum equal to

$$P_s \sqrt{\bar{N}_l / \bar{N}_s}$$

where P_s is the proportion of blocks to be drawn from the "small-block" stratum, $\bar{N}_l$ is an estimate of the average number of families per block in the "large-block" stratum, and $\bar{N}_s$ is an estimate of the average number of families per block in the "small-block" stratum.

As an illustration, assume that a sample of 5 per cent of the households of the city is to be taken, and that the estimated average number of families per block in the "small-block" stratum is approximately 25, and in the "large-block" stratum, approximately 100. Assume that there is not too much homogeneity within blocks. To obtain an average of about 5 families per block from the "small-block" stratum the subsampling ratio would be $5/25 = 20$ per cent. Since the final per cent of dwelling units to be included in the sample is to be the same in both strata and equal to 5 per cent, the proportion of blocks to be drawn from the "small-block"

group must be 25 per cent (because 20 per cent of the dwelling units in 25 per cent of the blocks gives the desired overall sampling ratio of 5 per cent). The proportion of blocks to be drawn from the "large-block" stratum would then be

$$25\sqrt{100/25} = 50 \text{ per cent},$$

if we follow the rule just given; and the subsampling ratio for the "large-block" stratum would be 10 per cent (because 10 per cent of the dwelling units in 50 per cent of the blocks are needed to give the desired overall sampling ratio of 5 per cent).

The sample estimate of various population averages and percentages, again, can be the ratios, or averages, computed from the sample returns themselves. Not only can these estimates be made from the sample, but also measures of their precision can be derived from the sample.

The introduction of subsampling may make it possible to attain, with perhaps a 3 per cent sample of families, the same accuracy that would result from a 10 per cent sample if the blocks were to be completely enumerated. Such a decrease in sample size for equivalent reliability is not unusual when one uses a reasonably close approximation to the optimum design, and may save considerably in time and cost.

ESTIMATION OF TOTALS

It should now be made clear that the preceding discussion of methods of sampling from a city has been particularly concerned with a method for estimating proportions, percentage distributions, or other average characteristics from the sample, and not with the problem of estimating the total number of persons in the population, or the total number of sick persons, or other similar aggregates that will be highly correlated with the total population. Some special modifications of these methods are needed for this latter problem.

POPULATION OR DWELLING-UNIT SAMPLING WHEN A REASONABLY COMPLETE LIST OF ADDRESSES IS AVAILABLE

Another type of resource may sometimes be available that can be used to achieve the desired results at lower cost, for estimating aggregates as well as averages or ratios. Sometimes a relatively recent city directory or other moderately complete listing of dwellings in an area is available. Such listings may be used effectively and without biasing the sample results, even though they are incomplete, provided they do not contain duplicate listings for the same address.* This type of resource can be used by proceeding in the following way:

The dwellings in the city can be regarded as divided into two major strata for sampling purposes: (a) the dwellings that are listed in the directory; and (b) the dwellings that are not listed in the directory. The sample from the stratum consisting of those listed in the directory can be sampled directly from the directory list. In some instances they may be sampled in small clusters from the list if evaluation of cost considerations, together with the increased sampling variance resulting, points to such an approach. In such a sample some addresses may no longer represent dwellings. This is the case if a building has been converted to non-residential use, or torn down or destroyed, or has otherwise disappeared. No substitution should be made for these since the sample of addresses should reflect such disappearance.

The sample of the remaining dwellings in the city—those that do not appear in the directory—should be drawn by a block sampling procedure similar to the

* In certain instances they can be effectively used even with duplicate listings of the same address but some modification of the procedures is required.

one outlined above, and here whole blocks are likely to be efficient sampling units, without segmenting or subsampling, except in "new-construction" areas. The procedure for this stratum of dwellings not in the directory will be to check the directory for each sample block and pick up from this sample of blocks only those dwellings that do not appear in the directory. If there are in the city some blocks that have an especially large amount of new housing, it may be desirable to define these blocks as constituting another special stratum, and sample this stratum by the regular block sampling method described earlier, disregarding any directory sample falling in these particular blocks.

CONCLUSION

An attempt has been made to point out that there are many ways one can go about designing a sample. There are many other principles that have not been mentioned that can be used to increase the efficiency of a sample. Stratification is desirable and almost universally used, although not absolutely essential as is often thought to be the case. Alternative methods of estimation may be available, etc. As already indicated, sampling theory guides in the choice of efficient methods from among the available alternatives.

The same fundamental principles are applicable in problems of sampling business establishments, dwelling units, farms, factories, and other groups, although the relative importance of the particular principles to be used varies among the different problems. One can make variations in design to meet various administrative limitations and conditions and to make the maximum use of the particular resources available. The practical job of sampling design involves the use of sampling theory, a knowledge of the techniques of collection and enumeration, a thorough search for the best resources available, and the use of these jointly in order to get the most reliable results per unit of cost. There are many ways that a probability sample can be drawn. It can be adapted to meet the requirements of a particular situation.

It needs to be strongly emphasized that if results of known sampling reliability are desired, it is not sufficient to designate a good sampling method. It is essential that it be carried through in both the office and field according to specifications. Therefore, it must involve processes that can be carried through by the kind of personnel available. There must be established a supervisory and control organization and procedures to insure that the work is done substantially as specified. This is of exceedingly great importance when high precision of sample results is desired, and it accounts for a significant part of the cost in many sample surveys.

It was previously indicated that the effective use of available resources is the way to maximize the information per dollar. For practical survey designs, much of the material that may be needed and useful is already publicly available. Census data published for individual blocks may be particularly useful. In addition, the Bureau of the Census has developed unpublished materials for use in its own sampling. Sometimes these materials can also be quite effective for other groups, and the Bureau of the Census is glad to make them available at cost. There is available, for example, a set of maps outlining detailed rural areas that can be thought of as blocks. These maps were developed jointly by the Bureau of the Census, the Bureau of Agricultural Economics, and the Statistical Laboratory of Iowa State College. They can be used in drawing rural samples of the population. In urban areas, certain materials have been developed on block designation and size that sometimes can be useful in increasing the efficiency of sampling. In con-

nection with business establishment sampling, there is available rough identification of the number of stores by blocks for most blocks in cities of 25,000 population and more. These materials are widely used in our own sampling work. They are particularly important to the census for large-scale operations in the estimation of totals as well as ratios and averages, and where results of comparatively high precision may be required. The Bureau of the Census is glad to assist in exploring the possibility and desirability of using these materials for any particular job.

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Direction of Research on Vaccination against Influenza—New Studies with Immunologic Adjuvants*†

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IN the years following the epidemic of influenza A in 1943, when vaccination reduced decisively the incidence of this disease, interest in the use of the vaccine mounted sharply at first and then declined abruptly. To explain this, in part, Figure 1 has been prepared as a summary of some of the recent experiences with vaccination against influenza. During the epidemic of influenza A in 1943, in the studies conducted by the Commission on Influenza,[1] attack rates of 7.1 per cent and 2.2 per cent respectively were observed in control and vaccinated groups. In 1945, during the epidemic of influenza B, attack rates of 11.2 per cent and 0.9 per cent respectively were recorded in unvaccinated and vaccinated populations. The latter figures represent the composite results of studies in military units under observation at the University of Michigan [2] and at Yale University.[3] In striking contrast to these findings, in which three times as many cases occurred in controls in 1943 and ten times as many in 1945, no significant difference was observed in 1947 in treated and untreated individuals in an outbreak caused by a virus of the type A group.[4–6] The absence of any effect in 1947, it is unanimously agreed, was due to the prevalence of a virus significantly different antigenically from the viruses contained in the vaccine. The type A antigens then represented in the vaccine, although highly active in the formation of homologous antibody in vaccinated human subjects, induced little or no antibody for the 1947 viruses; [4] tentatively, for convenience, strains related to the 1947 viruses have been referred to as type A-prime.

Although the principle was established firmly in 1943 and 1945 that vaccination could be effective in reducing the incidence of influenza, the 1947 experience raised questions that remain to be answered. The antigenic composition of the vaccine was broadened for the following year to include coverage of the portion of the type A spectrum heavily represented in the A-prime strains of 1947, and in the spring of 1948 it was observed [7] that a greater measure of protection was afforded by the new vaccine when compared with the earlier preparation.

Before discussing the problem of antigenic variation it is desired to draw attention to another question that will be considered in more detail later. The observation has been made repeatedly, not only in the field trials of 1943 and

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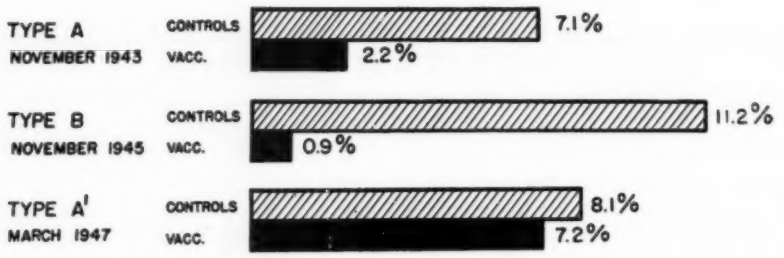
† This investigation was conducted under the auspices of the Commission on Influenza, Armed Forces Epidemiological Board, Office of the Surgeon General, United States Army, Washington, D. C.

FIGURE 1

INCIDENCE OF INFLUENZA IN CONTROL AND VACCINATED GROUPS.

FIELD STUDIES BY COMMISSION ON INFLUENZA



1945 (Figure 1) but in studies conducted with vaccines of broader antigenic coverage prepared subsequent to 1947, that not all vaccinated individuals are protected. This observation is related to one of the most prominent of the problems still to be resolved—that of enhancing the effectiveness of the procedure for prophylaxis to effect not merely a statistically significant reduction in the incidence of disease among treated individuals but to furnish distinct protection for all vaccinated persons. Under such circumstances the administration of vaccine to a sufficient proportion of a population could be expected to prevent the epidemic phenomenon.[8] In addition, of course, it would be desirable to be able to maintain the period of effective resistance for more than one season.

The importance of these problems has been recognized for a long time and their solution is a logical extension of developments to the present. However, attention to these questions has, to a great extent, been overshadowed since 1947 by problems related to the existence of diverse antigenic varieties, within the A type especially. In view of the importance of the question of antigenic variation, it is desired to comment briefly upon this aspect of the problem of influenza immunization before discussing those questions dealing with enhancement of the effectiveness of vaccines.

ANTIGENIC VARIATION

There exists among some an attitude of futility regarding the possibility of ever devising a suitable preventive against influenza. This attitude is based largely upon the interpretation of the 1947 occurrence and subsequent events[9, 10] as indicating that the virus of influenza A is constantly changing its antigenic coat of many colors and that we will always be vaccinating against the agent that prevailed the year before. Upon critical reflection this view appears to be rather shortsighted and one formulated without due consideration of all of the pertinent facts.

When one considers that but two distinct immunologic types have been identified as the cause of human disease, in almost two decades since the discovery of the viruses of swine[11] and human influenza,[12-14] it would appear that the capacity possessed by these agents for the development of major variants is limited. If the contrary were true, one

might have expected that a myriad of unrelated antigenic varieties would have developed in the course of human history, many of which might have been expected to have persisted and certainly to have been encountered in the interval since the influenza viruses were first discovered. In further support of the view that the extent is limited to which antigenic variation might occur, is the evidence that antigenic variants which develop in the course of laboratory passage differ from the parent culture in a measurable but only minor degree.[15-17] No one has ever encountered a major laboratory variant, the antigenic properties of which extend outside the presently known limits of the spectrum for the two recognized types. As for variations in pathogenicity of influenza viruses for man or laboratory animals, it appears that such changes occur without corresponding changes in antigenic character; and information is inadequate in regard to association of particular antigenic varieties and the more severe epidemics or pandemics.

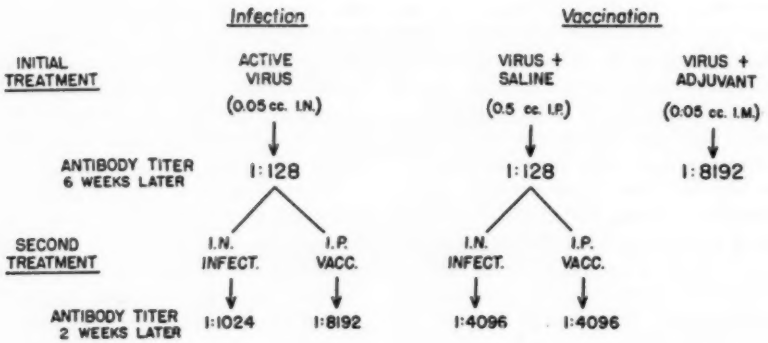
As a working hypothesis it might be suggested that there exists a finite, but as yet undetermined, number of antigenic facets characteristic of each of the two types of influenza viruses and that these are arranged in different combinations in the strains that differ from one another. To this postulate it would not be unreasonable to add that in a culture of any one strain it is probable that the virus population is more or less heterogeneous and that one particular combination of antigenic components predominates to give the "strain" its characteristic behavior or properties. A corollary of this might be that under suitable circumstances of selection, through the suppression of particles that are in the majority or through the operation of some factor favoring certain of the virus particles that are in the minority, the antigenic behavior or other characteristics of the "strain" might change. If the view is correct that a finite number of antigenic components exist, and that the strains that occur from time-to-time are restricted in their capacity to vary within definite limits characteristic of the particular type, it would seem that we have at our disposal the means for synthesizing a vaccine preparation that could be expected to be effective against future strains. From this viewpoint, future strains would consist merely of different combinations of the various antigenic components belonging to each type.

Whether or not this hypothesis is valid, will be revealed in time; however, it is quite in accord with the mechanism of the behavior of other infectious agents and provides a more hopeful outlook for the ultimate control of influenza by vaccination than does the concept expressed recently by several workers of constant change with the development of new varieties and disappearance of the old.[9, 10]

It is evident that the ultimate goal in the continued study of influenza immunization is the synthesis of an immunizing agent effective against all antigenic varieties about which we now know; and for the development of such a preparation to induce an effective lasting immunity. For achieving this objective, it will be necessary to maintain a continued search for influenza viruses in interepidemic periods as well as in well defined outbreaks, and then to match immunologically current viruses to strains included in vaccines of the broadest antigenic composition. Within limits, differences among strains determined by comparison of serum from immunized animals may not necessarily reflect differences of significance for vaccination of man. For evaluating recently isolated strains for significance of antigenic differences demonstrable in laboratory animals, serologic studies have been made recently in man, in collaboration with Colonel Adam J. Rapalski. From

FIGURE 2

COMPARISON OF ANTIBODY RESPONSE IN MICE TO INFECTION AND TO VACCINATION.



these investigations it does not seem that it will be difficult to select a group of strains for inclusion in a vaccine that will encompass the complete antigenic spectrum of the known influenza A and influenza B viruses. These studies are to be reported separately; for this reason, the remainder of this paper will be concerned with studies directed toward enhancing the immunizing effect of the vaccine.

PROCEDURES FOR ENHANCING VACCINE EFFECTIVENESS

From the very beginning of studies on influenza immunization, both in animals and in man, the desirability for achieving the highest possible levels of antibody was thoroughly appreciated. It has been assumed, and with good reason, that the elevated levels of antibody are associated with a corresponding enhancement of immunizing effect.[18-21] Before describing current studies it is desired to mention the various procedures that have been explored to raise the titer of serum antibody to the highest levels possible. The methods employed are as follows: (1) multiple inoculations,[22] (2) increasing the concentration of virus in the vaccine,[23] (3) intracutaneous inoculation,[24] (4) selection of strains of high antigenic capacity as well as broad antigenic coverage,[25] and (5) the use of adjuvants.[26] All but the last of the five procedures listed have been tried with little success beyond that which can be achieved with the vaccines and the procedures presently in use.

In regard to the use of adjuvants, it will be recalled that Friedewald [27] and the Henles [28] applied, in mice and man respectively, a method described by Freund [29] involving the emulsification of antigens with mineral oil in an effort to enhance the antigenic effectiveness of influenza virus vaccine. This approach was abandoned, however, because of the occurrence of undesirable local reactions, not only in experimental animals but in human subjects as well.

NEW STUDIES WITH IMMUNOLOGIC ADJUVANTS

The desirability of pursuing the question of the applicability of mineral oil

TABLE 1

Development and Persistence of Antibody in Monkeys Vaccinated Intramuscularly with Influenza Virus (PR 8) Combined with Adjuvant or with Saline

Interval Post Vacc.	Monkey No.	Hemagglutination-Inhibition Antibody Titers in Monkeys Inoculated with Adjuvant Vaccine *			Saline Vaccine †		
		1	2	3	4	5	6
Pre-vacc.		<8	<8	<8	<8	<8	<8
1 week		256	256	256	16	16	8
2 weeks		2,048	2,048	2,048	64	64	64
4 weeks		4,096	4,096	2,048	128	128	8
6 weeks		32,000	8,000	8,000	128	128	<8
2 mos.		65,000	16,000	16,000	128	64	<8
3 mos.		65,000	32,000	Dead	64	64	<8
4 mos.		32,000	32,000	—	64	64	<8
6 mos.		16,000	16,000	—	64	64	<8

* 1 ml. of a mixture of equal parts of PR 8 vaccine and Adjuvant — mineral oil (Bayol F) + emulsifying agent (Arlacel A).

† 1 ml. of a mixture of equal parts of PR 8 vaccine and saline.

adjuvants to the solution of the problem of an effective vaccine for man is amply clear. It seemed to us, therefore, that some way must be found to circumvent the undesirable local reactions encountered by other investigators. In the course of certain other studies [30] it was observed that no local reactions occurred using Arlacel A [31] rather than Falba [27, 28] as the emulsifying agent, and a light mineral oil called Bayol F rather than the heavy mineral oil used earlier. It now appears that the undesirable local reactions may have been due in part to the reagents employed and in part to the fact that the preparations were administered subcutaneously rather than intramuscularly as has been done in these studies. These changes in procedure have permitted an intensive reinvestigation of the possible application of mineral oil adjuvants to the immunization of man against influenza.

Before presenting a summary of some recent experimental data, it is desired to illustrate the effect upon antibody response to *infection* as compared with response to *vaccination* and the difference between vaccination with a simple antigen as compared with an antigen combined with an adjuvant. In Figure 2 it can be seen that a single intranasal inoculation of active virus is no more effective in inducing antibody formation than is vaccine given intraperitoneally. Furthermore, a solid immunity is not engendered either by the intranasally induced infection or by the intraperitoneally administered vaccine. This is indicated by the second antibody rise after the second treatment repeated six weeks later. The high level of antibody following a single antigenic stimulus with virus and adjuvant is shown for comparison with the effect of the other procedures.

STUDIES IN MONKEYS

As a preliminary to studies in man, a series of investigations was begun in monkeys at our disposal after their usefulness for studies on poliomyelitis was exhausted. The initial experiments were designed to determine whether or not undesirable reactions would result and to evaluate the degree of effectiveness of the virus-oil emulsion in stimulating the formation of antibody. It was of interest also to determine the smallest amount of virus that, when incorporated with the oil, would be effective in antibody formation. These experiments will be reported in detail elsewhere; however, it is desired to indicate the trends that have been observed.

Table 1 shows the development and

TABLE 2

Hemagglutination-Inhibition Antibody Titers in Serum of Individual Monkeys 8 Weeks After Vaccination with Diminishing Quantities of Virus Combined with a Constant Amount of Adjuvant (First Expt. 1.0 ml. I.M.)

Vaccine (1.0 ml. I.M.)	Quantity of Stock Vaccine Incorporated in Inoculum * for Each Group				
	0.50 ml.	0.15 ml.	0.05 ml.	0.015 ml.	0.005 ml.
Virus	65,000	65,000	8,000	1,024	2,048
+	16,000	16,000	4,096	1,024	1,024
Adjuvant	16,000	8,000	2,048	512	512
				Controls	
Virus	128		16	<8	
+	64		8	<8	
Saline	<8		<8	<8	

* Virus Diluted Serially (½ log steps) and then incorporated with oily adjuvant.

persistence of antibody in monkeys in the six months following inoculation of virus with adjuvant or virus and saline. The marked enhancement in antibody response to the virus-adjuvant combination is strikingly evident; as is the degree of persistence of the elevated antibody titer. The similarity of these data with those published by the Henles,[28] on their experiments in man, is quite striking. The vaccines employed in these studies were inoculated into the calf muscle and at no time was there any impairment of function nor clinically discernible evidence of inflammatory reaction. Although a total of more than seventy monkeys was involved in this and other experiments, evidence of reaction was strikingly absent, in contrast to the observations made by the Henles who encountered subcutaneous nodules in almost all of their human subjects and abscesses in two out of eighty instances. Detailed histologic studies are in progress; however, it can be reported now that no gross evidence of inflammation was evident upon sectioning muscles at intervals up to four weeks following inoculation. With inocula of 0.1 ml. used in some experiments, the site of deposition of the emulsion cannot always be found.

To determine the smallest quantity of virus that will induce a measurable antibody response, two experiments have been carried out thus far. Table 2 shows the results of one such experiment where it can be seen that the quantity of antigen inoculated was reduced to the equivalent of 0.005 ml. of vaccine and still induced a high level of antibody. In another experiment, in which 0.1 ml. of emulsion was inoculated, antibody formation was still demonstrable with a quantity of antigen equivalent to 0.000005 ml. of vaccine. In contrast to this, vaccine without adjuvant in dilutions below 0.05 ml. was no longer effective.

Since the data shown in Tables 1 and 2 represent the results of antibody titrations determined by the agglutination-inhibition reaction, it was of interest to see to what extent the high levels of antibody detected by this *in vitro* method reflect virus neutralizing activity measured *in vivo*. The close correspondence of the titers of agglutination-inhibition antibody and neutralizing antibody measured *in ovo* is shown in Table 3.

The studies in monkeys reported very briefly here are being extended. In addition, these investigations are being carried into other experimental animals where quantitative data can be obtained regarding the relationship between the high levels of antibody achieved and the degree of immunity to infection.

TABLE 3

Serum Antibody Titer Measured by Hemagglutination-Inhibition and Virus-Neutralization in ovo

Vaccine	Monkey	Antibody Titer	
		Hemaggl.-Inhib.*	Virus-Neutral.†
Virus	1	65,000	200,000
+	2	32,000	80,000
Adjuvant	3	16,000	16,000
Virus	4	128	56
+	5	128	32
Saline	6	64	<5

* Highest dilution of serum inhibiting 4 units of hemagglutinin.
† Fifty per cent endpoint of neutralization vs. 1,000 EID_{50}.

TABLE 4

Experiments with Adjuvants in Progress in Human Subjects

Expt.	Material Inoc.	Vol. Inoc. ml.	Quantity of Virus Inoc. CCA units *	No. of Subjects	Reaction
I	Virus + Adjuvant	0.1	15	12	None
	Adjuvant alone	0.1	0	12	None
II	Virus + Adjuvant	0.25	300	6	None
	Virus + Adjuvant	0.10	120	5	None
III	Virus + Adjuvant	0.25	300	46	None or minimal and transient
	Virus + Saline	0.25	300	30	None or minimal and transient

* CCA content of new standard vaccines is 500 units/ml.

STUDIES IN MAN

After observing the safety and effectiveness of the preparations employed in monkeys, a series of studies in human subjects were begun to determine the extent to which the observations made in the experimental animal also applied to man. Table 4 contains certain details of the first three experiments. In the initial trial, 0.1 ml. of a mixture of equal parts of adjuvant and vaccine, containing 500 CCA units per ml., was injected intramuscularly into one arm and a similar volume of saline plus the adjuvant was injected into the other arm. In twelve individuals there was neither subjective nor objective evidence of inflammation.

The same technique of inoculation was employed in a second experiment in which 0.1 ml. or 0.25 ml. of a mixture of virus plus adjuvant was administered in two different groups. This time the preparation of virus employed consisted of a mixture of the PR8, FM1 and Lee strains and contained approximately 2,500 CCA units per ml.* When it was observed that no untoward effects occurred, a third experiment was set up in which one group was given 0.25 ml. of the emulsion containing equal parts of the concentrated virus preparation and adjuvant, and the other group was given 0.25 ml. of an inoculum consisting of the concentrated virus preparation mixed with an equal volume of saline. In this group, again, local reactions were absent or minimal. The minimal reactions consisted of an awareness for a day or two that an injection had been received. It was less marked in the group given the virus-adjuvant mixture than the group given virus in saline. Examination two

* This highly concentrated preparation was obtained through the kindness of Dr. I. W. McLean, Jr., Parke, Davis and Company.

weeks after inoculation revealed no abnormalities.

Although the serologic tests indicate a distinctly greater antibody response in the virus-adjuvant group as compared with the virus-saline group, the results are not presented at this time because a sufficient interval has not yet elapsed for the antibody level to reach a plateau in the groups given virus plus adjuvant. The results are such that testing on a much larger scale is already under way to establish further the safety as well as the limits of effectiveness of this procedure.

CONCLUDING REMARKS

It is the purpose of this paper, in part, to review from one perspective the present status and future prospects of influenza immunization and to introduce a hopeful note, with new data, to counter the pessimism that has prevailed abroad for a long time, and in this country since 1947. It is evident that progress has been made and that this progress, which began before 1947, was not negated but rather was furthered by the experience of that year. It is evident, also, that much remains to be done before the problem of influenza immunization is brought to conclusion.

To test the hypothesis that a finite number of antigenic varieties exist, search will continue for virus strains that occur sporadically in interepidemic periods as well as for strains isolated during epidemics to determine the relationship between the new outcroppings and the viruses included in a vaccine designed to cover the known antigenic spectrum of type A and type B viruses.

Field trials which are now in progress will be continued into the future for the purpose of testing under natural conditions the protective effect of any new vaccine preparations that appear safe and more effective.

In regard to the studies with adjuvants, additional work will be required before the most effective combination of virus and adjuvant will be devised and tested on a wider scale. Nevertheless, prospects are hopeful for a preparation that will induce consistently high levels of antibody that will be maintained for much longer periods than occur with preparations in use at present.

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The Encephalitis Problem in the United States*†

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ENCEPHALITIS is a comparatively new disease in terms of the years in which public health officials have been concerned with its effect on the public they guard. Analysis of present-day factual knowledge on this subject appeared timely to the program committee for this session, and in its letter of invitation it posed questions which public health departments might be called on to answer. These questions were: "(1) How much of a public health problem is encephalitis? (2) Where does it occur? (3) What are the methods of transmission? and (4) What should public health departments be doing about its control?"

If one is to discuss these questions, there are certain basic premises which must be understood. First, the term encephalitis is descriptive of a pathological or clinical condition unrelated to cause. Twenty years ago this was the only designation available, as causative agents, host range, and methods of spread were unknown. Today this is not true, and a host of infectious agents and toxic substances, arising from many sources and spread by a variety of methods, are known to be capable of producing an inflammation of the brain, or encephalitis. These agents may be divided into those where this phenomenon is relatively common, thus constituting a public health problem as exemplified by the "infectious encephalitides," and those where encephalitis is incidental or rare. No doubt the program committee had in mind a discussion of what we frequently define as "The Arthropod-borne Virus Encephalitides,"[1] with restriction to problems in the United States. Therefore, I shall discuss the virus encephalitis infections spread by arthropod vectors, with no further mention of encephalitic conditions arising from other infections such as mumps, measles, vaccinia, the influenzas, etc., or from toxic agents, all of which have been reviewed elsewhere.[2-6]

CAUSATIVE AGENTS

In North America the three principal types of encephalitis are infections caused by Western equine, Eastern equine, and St. Louis viruses. In addition, in recent years, several new viruses have been isolated from mosquitoes by various research workers, and it is suspected that these might produce clinical encephalitis in man.[7, 8]

Various exotic arthropod-borne virus encephalitides are constantly being studied, and their accidental importation guarded against in the United States. Outstanding among these are Japanese B encephalitis, Venezuelan equine encephalitis, and Louping Ill viruses, from the Pacific area, Latin America, and Europe respectively.[6] All have arthro-

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† Original data were obtained in investigations supported (in part) by a research grant from the Virus and Rickettsial Study Section, Division of Research Grants and Fellowships, U. S. Public Health Service.

pod vectors and could constitute a public health problem if introduced into North America.

This is by no means an exhaustive list, as some twelve viruses transmitted by arthropod vectors are now known to be capable of producing an encephalitis.[6] Each year new ones are discovered.

PUBLIC HEALTH PROBLEM

As a cause of clinical illness or of death, the encephalitides have generally played a subordinate role in the public health problem of North America. I realize that others might take exception to this statement, especially here in St. Louis where the first major outbreak of encephalitis in the United States was recognized in 1933.[9, 10] However, what epidemics have been reported up to the present time and what have been their magnitudes? The careful investigation of the epidemic of St. Louis encephalitis in St. Louis, Mo., in 1933 disclosed 1,095 clinical cases, with an attack rate of 100/100,000 population and a case fatality rate of 20 per cent. A second epidemic of 518 cases was recognized in this area in 1937.[10] In retrospect, several smaller epidemics in other states were recognized as having similarities sufficient to warrant their consideration as possible outbreaks of the St. Louis disease. During 1941, the most severe epidemic of Western equine encephalitis experienced in North America was reported from the North Central States and adjacent provinces of Canada. This outbreak was studied and reported on by a number of workers.[11-15] From Minnesota alone, 791 cases were reported.[15] The attack rates varied from 2.3/100,000 to 22/100,000, depending on whether urban or rural populations were considered. Numerous other localized, relatively minor, epidemics of Western equine and St. Louis encephalitis have been reported, primarily from the Western states.[16-23] To date, there have been only these three major epidemics. The third principal virus, Eastern equine encephalomyelitis, has never produced a major epidemic, although several small, relatively localized outbreaks have been described.[18, 24-27]

Recognizing the infrequency with which epidemics have been observed and the relatively small number of cases observed in most years, one might ask why have public health authorities been concerned with this problem, why worry about their potential importance? I believe the reasons may be indicated as follows: (1) During past epidemics and in endemic areas, public health authorities have not been able to recommend a method of controlling the problem. When even minor, localized epidemics have occurred, they have received vast publicity, gravely alarming the public about a disease for which control measures have not been perfected. (2) Extensive epizoötics of the Western and Eastern viruses in horses have posed serious economic problems. The knowledge that these viruses may also infect man has led to the belief that similar episodes could occur commonly in human beings. (3) Available knowledge of the epidemiology of these infections has not received adequate dissemination to the local public health personnel who are responsible for recognition and control of the diseases and for the education of the public. (4) There is a lack of universal acceptance of epidemiological findings indicating that a method of control may be available for adequately studied areas. (5) In many endemic areas agricultural irrigation projects are rapidly developing. It is thought possible that such reclamation and development projects may increase the population of vectors, thus increasing man's risk of contracting encephalitis.

GEOGRAPHIC DISTRIBUTION

As a result of the intensive efforts of several research teams, it is now known that these three virus infections are

endemic in a number of areas, including some where even minor epidemics have never been recognized and these infections seem to be characterized by a more or less constant endemic level.

The Western equine virus has now been shown to be present in all the states west of the Mississippi River and as far east as Michigan in the north and Alabama and Florida in the south. Most of this knowledge is based on recognition of the disease in horses. In so far as I know, there is no state where infection has been recognized in man before being detected in horses. Thus, equines have served as excellent sentinels for alert public health officials, and we are deeply indebted to the veterinarians, and especially the Bureau of Animal Industry of the U. S. Department of Agriculture, for this knowledge.[28]

The Eastern equine virus is distributed along the eastern seaboard from New England in the north, south to Florida, and west to Texas and Michigan. The disease in horses has once again served as an indication of its range. In the event of further spread, the infected horse should continue to serve as an index of distribution.[28]

A consideration of the known distribution of St. Louis encephalitis emphasizes our limited knowledge. The same would be true for the Western and Eastern equine infections were it not for the data we have on their occurrence in horses. St. Louis virus is known to be present in the Pacific Coast, southwestern, and midwestern states where evidence of its presence has been carefully sought,[9, 16-19, 22, 23, 29, 30] but very little is known concerning details of its distribution except in areas where special studies have been made.

For a complete picture of the distribution of the disease, all clinical cases of encephalitis in man in North America would need to be subjected to the complete laboratory studies which such patients have received in a few special areas in the course of intensive studies.[31] To determine the areas where subclinical infection is present, extensive epidemiological surveys would be required. Up to the present time, the laboratory facilities for such a program have not been available. Indeed, a public health problem of the magnitude to justify such an expensive effort has not been apparent.

Method of Transmission

It is difficult in a limited time to review all available data on the possible means of transmission for these encephalitides. Undoubtedly an important concept is that man and horse, as the vertebrate hosts in which infection most commonly produces clinical disease, are accidental entries into an infection chain which normally is limited to birds and certain bloodsucking arthropods such as mosquitoes and possibly mites. As a basis for later discussion of control, let us review briefly our present knowledge of the range of vector and host species and their interrelationships.

The evidence now indicates that the epidemiology of the encephalitides is the most complicated of any of the known arthropod-borne diseases.[1, 6, 7, 32] Perhaps it appears to be complicated only because we do not clearly understand the interrelationships of all the evidence accumulated to date. When only clinical infection was recognized, our knowledge of host range was limited to man and the horse. The observation that inapparent infection was very common in both man and horse was later extended to include many other animals, and has led us into a constantly expanding appreciation of host range. Unfortunately, our present knowledge is limited to a few areas in which special studies have been made.[33-41]

In several regions, domestic birds such as chickens are now accepted as important sources of vector infection with Western equine and St. Louis viruses.[7,

[21, 34, 42, 43] In addition, recent studies in Kern County, California, have shown that many species of wild birds are of equal or greater importance.[44] In this one area we know that at least five species (English sparrow, house finch, and three species of blackbirds) are involved. Yet these are only five of over 170 species of wild birds known to be present in Kern County.[45] The majority of other species have not been ruled out; adequate studies have not been completed. In dry farming areas of the midwestern United States, it appears that wild birds may be of more importance than domestic birds as sources of mosquito infection.[35-37] Published evidence that large or small mammals,[46-49] including man, will commonly serve as sources of vector infection or reservoirs of infection are far from convincing.

Present evidence may be summarized as indicating a widespread source of vector infection in a variety of domestic and wild avian hosts. Infection in these birds is characterized by a complete lack of clinical evidence of infection (with the occasional exception of Eastern equine virus,[40, 41]), the appearance of virus in the blood stream in high titer for a short period of time, and no evidence of chronic infection or a carrier-reservoir stage.[40, 42, 43]

What are the possible means of spread of this infection from bird to bird and to clinically susceptible hosts such as man?

At the present time, it is known that three genera of mosquitoes, *Culex, Aedes,* and *Culiseta,* can serve as experimental vectors of Western equine and St. Louis viruses, and species of these three groups have been found naturally infected.[7] However, as a basis for control, the relative vector ability of the various common species of mosquitoes in the area must be determined for the regions where one or more of the encephalitides occur. In certain areas, evidence indicates that *Culex tarsalis* is a primary vector of Western equine and St. Louis encephalitis. There it is essential to the propagation of these infections in nature. Epidemiological evidence that this species may also serve as a vector to man is just as conclusive as that for the accepted vectors of jungle yellow fever, malaria in many areas, murine typhus, plague, and many of the other arthropod-borne diseases. However, I must reëmphasize that this does not mean this mosquito is the *only* proven or possible vector in nature or to man. The occasional demonstration of natural infection in other *Culex, Aedes,* and *Culiseta* species and the recent demonstration of natural infection of *Mansonia* with Eastern equine virus,[50] coupled with demonstration of a wide range of mosquito species which may experimentally transmit these three viruses,[40, 51, 52] would make such an assumption foolhardy. This is especially true, until epidemiological investigations to clarify the picture have been made in unsurveyed or inadequately studied areas of North America. There are many regions where one or more of these viruses are present, and where *Culex tarsalis* is not found or is very rare. This gap is not surprising when one considers that few arthropod-borne diseases are completely dependent on a single species of vector for their survival—biologically, a broader spectrum is essential.

Aside from mosquitoes, what other arthropod vectors are involved in the transmission of these viruses? It has been felt for some time that mosquito transmission, or latent infection in vertebrate hosts did not explain the winter carry-over of virus infection or the appearance and disappearance of infection from certain areas.[1] In the ever widening search for other means of spread, various ticks,[21, 53-55] kissing bugs,[55, 56] and other arthropods [57, 58] have been considered and discarded from consideration for various reasons. In recent years the bloodsucking mites parasitic on domestic and wild avian hosts have re-

ceived attention. Unfortunately, at this time the role of mites as vectors must be considered a controversial subject, but a subject important to the present discussion because it still offers the potential key to a difficult problem.

In 1944, it was announced that St. Louis encephalitis virus had been isolated from the mite *Dermanyssus gallinae*, collected from chickens.[59] In the following year, Western equine virus was isolated from the same mite,[60] and in 1948 the isolation of Eastern equine virus from this species was accomplished.[58] This series of announcements was impressive, and has given rise to acceptance of the idea that the common factor for these viruses had possibly been found, thus filling in the transmission void left by mosquitoes and vertebrate hosts that was mentioned earlier. In addition, both Western equine and St. Louis viruses have been isolated repeatedly from a wild bird mite *Liponyssus sylviarum*,[61, 62] and Western equine virus from the tropical fowl mite *L. bursa*[63] and possibly *Dermanyssus americanus*.[61]

However, to complete the picture it was also necessary to demonstrate that these mites were capable of transmitting the various viruses. We must recall that arthropods can be infected with many disease agents, without being capable of transmitting them. This has been a frequently overlooked pitfall in epidemiology. Dr. Smith and her colleagues now have reported extensive experiments in which *Dermanyssus gallinae* was demonstrated to transmit the St. Louis virus from chicken to chicken, and mosquitoes fed on these chickens also became infected.[32, 64] In addition, they reported that infected female mites frequently transmit the infectious agent through their eggs to the next generation.[65, 66] This would appear to fill the gap of a long-term reservoir of infection and means of winter carry-over of virus for the St. Louis infection. Unfortunately, I must add reservations to the above statement. Up to the present time, this work has not been confirmed by any other investigators, either with *Dermanyssus gallinae* or with *Liponyssus sylviarum*, in extensive experimentation with the St. Louis, Western equine, and Eastern equine viruses.[1, 44, 67] Most research workers in this field still feel it essential to obtain extensive confirmation of the vector role of mites before they are considered as a basic link in the infection chain of these viruses. This is not a criticism or condemnation of the accomplishments of Dr. Smith and her colleagues, but rather an expression of a widespread scientific conservatism and the "we-are-from-Missouri" attitude of epidemiologists in this field.

CONTROL

I believe we are now in a position to consider the last question, "What should public health departments be doing about encephalitis control?"[39, 68-70]

The first answer is that I do not believe that the average state or local public health department in North America is in a position to do anything about initiating a specific control program. This statement may shock you, but I believe it is defendable on the basis that there are few areas in which the present or past incidence of any of these encephalitides is known. You may reply, "Why, we have been keeping morbidity records of infectious encephalitis for many years." To which I have only to reply, "What proportion have been Western equine, St. Louis, or Eastern equine infections?" There are few areas in which this question can be answered and I do not feel that any type of an organized long-term control program is justifiable in the absence of such data. In the endemic area of California a control program attacking the mosquito vectors of encephalitis was not initiated until 1946, at which time a backlog of information including eight years of confirmed Western equine and

St. Louis encephalitis cases and detailed epidemiological data on vectors, animal hosts, and methods of control were available as a basis for the program.[71, 72] I think we all accept the general public health principle of evaluating the local problem on the basis of its specific nature, its importance, and the economic feasibility of control before initiating a program. Encephalitis is no exception to this rule.

A primary difficulty in evaluating the problem is establishing a diagnosis, which requires extensive and specialized serological tests. As I stated earlier, laboratory facilities for such work have been limited; however, this limitation is decreasing as numerous federal, state and university laboratories are now performing such tests on request, and will offer facilities for training personnel to establish new laboratories.

In the event that one or more of the encephalitides is established to be endemic or to have an epidemic potential in an area, what can be done in the nature of a planned program of control?

Vaccines have been developed for the Western and Eastern equine viruses and are commonly employed for protection of horses, and laboratory and field investigators subject to heavy exposure. Vaccines appear to be impractical for protection of the general population, because of cost, the temporary nature of the immunity produced, and the relatively low clinical attack rate as compared with the inapparent infection rate. In the event of an epidemic, a vaccinating program would be impractical because of time factors. At the present time, there is no specific therapeutic agent available.

In known endemic areas with epidemic potentialities, a control program aimed at mosquito vectors may be practical. A primary consideration in this program will be economic feasibility. In areas of large population and high economy, mosquito control is frequently justified and carried out on a pest control basis alone. Where such a program is in effect, it may be modified to include special emphasis on vector species. This has been the case in California.[73, 74] In areas where a new program is being stimulated, a health department could frequently justify a program and obtain funds to support it by combining the two programs at the outset. However, it should always be kept in mind that a program aimed at the specific vector or vectors in an area will be more effective than general measures.

A basic part of any well organized vector control program is modification of the environment to render it unsuitable for the vector. This type of approach is well illustrated by the present project of the U. S. Public Health Service, Communicable Disease Center in the Missouri River Basin Area.[75-77] On the basis of past history, this is known to be an endemic area for Western equine and St. Louis encephalitis. At the present time the Land and Water Resources Development Program of the Basin is greatly extending the supply of water in the region, converting dry farming to irrigated farming areas. This increase of surface water, if improperly managed, will inevitably increase the sources of vector mosquitoes. Because of the potential risk of increase in incidence of the various virus encephalitides, appropriate control measures and methods of handling water are being incorporated in this project during the developmental period. The justification for such a program has been the existence of an actual public health problem which might increase materially if such steps were not taken. A comparably practical program can well be carried by the local health department down to the individual landowner.

To me the most important and appropriate steps for a state or local health department to undertake in the control of encephalitis today would seem to be:

(1) evaluate your problem, (2) if a problem exists, initiate an educational program for the public based on the following facts: the true extent of the problem, its actual potential importance, what is known about the epidemiology of the disease in general and specifically for your area, and, on the basis of this knowledge, what can be done by the individual as well as official agencies to control the disease or prevent infection.

An explanation of how encephalitis is spread, the importance of handling water in such a way as to prevent mosquito breeding, and methods of protecting one's self from adult mosquitoes by screening and repellants, will frequently lead to the adoption of such measures by lay persons with gratifying results.

At the present time there would appear to be no possibility of controlling encephalitis by an attack on the widespread avian hosts or their mite ectoparasites, if the latter are proved to be important vectors.

SUMMARY

A review of the encephalitis problem in the United States indicates that it is desirable to limit this consideration to three specific infections, Western equine, Eastern equine, and St. Louis encephalitis, all of which are characterized by having arthropod vectors.

The known distribution of these diseases and the number of recognized cases indicate these infections as widespread in North America, but as—so far—a relatively minor public health problem. Certain factors such as the occasional major epidemics observed, widespread epizoötics in horses, limited demonstration of control methods, and possible future changes in the balance of environmental factors have led to the belief that these diseases may have an epidemic potential.

A consideration of the natural history of these agents indicates a complicated infection chain characterized by a completely inapparent infection in nature. This involves birds as hosts and mosquitoes as vectors, with mites or some unknown factor serving as a long-term reservoir. Inapparent infection may become a public health problem when the mosquito vector transfers the causative agent to clinically susceptible human hosts.

In most of North America the need for, or advisability of, developing a local control program cannot be evaluated until local health departments determine the extent and nature of the problem in their areas.

In those epidemic and endemic areas where necessary studies have been made, it has been concluded that a control program based on protection from mosquito vectors offers great promise. In the event of a recognized epidemic of Western equine, St. Louis, or Eastern equine encephalitis, the author would recommend a control program based on individual personal protection from mosquito vectors and, if practical, specific vector abatement.

It will be important for public health departments to keep abreast of new developments in this field, as current comprehensive investigations by federal, state, and university research workers will undoubtedly clarify the many unanswered questions presented today.

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Results Obtained with a Glycerolated Vi Antigen in the Detection of Chronic Typhoid Carriers

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CONTINUOUS improvement in sanitation has practically eliminated from the Province of Quebec, waterborne, milk-borne, and other alimentary-borne epidemics of typhoid fever. In many areas, however, there exists a residuum of typhoid infection evidenced by sporadic cases often caused by chronic carriers of *Salmonella typhosa*.

Unfortunately, since only a small fraction of these carriers are known to the public health authorities, their adequate supervision is impossible. Isolation of *S. typhosa* is the most convincing method of determination of the carrier state. Even with our refined modern cultural methods, however, the isolation of *S. typhosa* remains an expensive, laborious, and often uncertain procedure. Coupled with these difficulties is the well known biological phenomenon of the intermittent excretion of bacilli which is peculiar to the chronic typhoid carrier. For these reasons, we do not believe that the existence of the carrier state should be denied on the evidence of one or two negative fecal specimens.

Knowing the limitations of cultural methods, many workers have explored the use of serological methods for quick and reliable detection of the potentially dangerous carrier. Use of Felix's qualitative serodiagnosis as a screen test to reduce the number of carrier suspects has met with limited success, since a rather high proportion of the sera of individuals contains O and H agglutinins. A new serological approach was opened when Felix and Pitt (1934)[1] described the Vi antigen of *S. typhosa*. The discovery by Felix, Krikorian, and Reitler (1935)[2] of Vi antibodies in a carrier's serum led to the suggestion that these antibodies might be present in all chronic carriers.

Subsequently, this Vi agglutination test was routinely performed in England by Felix [3]; in the United States by Eliot and Cameron,[4] Coleman,[5] Klein,[6] Almon, Read, and Stovall,[7] Young and Felsenfeld,[8] and Gunther [9]; in Italy by Giovanardi,[10] and Attili and Georgetti [11]; in Germany by Knapp [12]; in South America by Campbell [13]; in India by Bhatnagar [14]; in South Africa by Pijper and Crocker.[15] Although confirming the usefulness of the test, most of these workers expressed serious reservations regarding the specificity and sensitivity of the reaction and the stability of the Vi antigen.

The purpose of this paper is to describe a Vi agglutination test presenting unusual qualities of antigenic stability, specificity, and sensitivity. The conclusions reached are based on the examination of 26 typhoid carriers, 9,192 normal individuals, 1,164 vaccinated persons, and 530 typhoid patients.

METHOD

Principle of the Method—The most serious limitations of the Vi agglutination test have been the lack of a stable agglutinable antigen, and the necessity of absorbing O and H agglutinins from sera to be examined when smooth, motile strains of *S. typhosa,* rich in Vi, O and H antigens, were used as formalinized agglutinating suspensions.

Following Dr. James Craigie's suggestion, one of us (J.M.D.) undertook studies on different Vi strains and vehicles in order to find a method which might eliminate these two difficulties. The problem of stability was partially solved when Peluffo,[16] and Desranleau,[17] demonstrated that ethyl alcohol, absolute or at a concentration of 75 per cent could preserve the stability of Vi antigen. In the latter paper, Desranleau went further by showing that Vi suspensions mixed with a 50 per cent glycerol solution in 0.1 per cent sodium chloride at pH 7.0 were still stable after a period of 6 months as evidenced by their high agglutinability in Vi antiserum and complete inagglutinability in saline and in O and H antisera. This stability was fully confirmed in field studies by Gunther.[9]

Preparation of the Antigen—The antigen used in the test is the Bhatnagar strain Vi I of *S. typhosa* which is a pure Vi reagent as far as agglutination reactions are concerned. This strain is maintained on an egg medium in the cold room as recommended by Kauffmann.[18] When preparing fresh suspensions, the stock culture is plated on nutrient agar. After 24 hours' incubation at 37°C., the growth obtained is carefully inspected to observe its content of colonies in the smooth phase, i.e., opaque, mosaic-like colonies with regular edges. However, since this Vi I strain has the tendency to degrade quite readily to the rough state, it is sometimes necessary to reverse this S → R variation: two or three passages on Crossley's starch agar medium[19] yield satisfactory smooth colonies, which do not react with O and H antibodies of *S. typhosa.* From this purified culture, 2 ml. of nutrient broth, pH 7.8 are inoculated and incubated at 37°C. for 3 hours, or until a density of 10^9 bacilli per ml. is obtained. Petri dishes of 2.5 per cent nutrient agar, pH 7.4–7.6, previously dried with covers removed in the incubator at 37°C. for 2 to 3 hours, are inoculated with 4 loops (0.02 ml.) of the broth culture. After 18 hours' incubation, the growth is washed off with 10 ml. of 75 per cent ethyl alcohol. This suspension is thoroughly mixed in a sterile flask and stored in the cold room for at least 5 days. This stock suspension is then sterile and will keep for many months.

The test suspension is prepared by centrifuging the alcoholic suspension in 10 ml. amounts at 2,500 r. p. m. for 30 minutes. After decanting the supernatant, the packed cells are washed twice with distilled water and resuspended in 5 ml. of 0.1 per cent sodium chloride buffered at pH 7.4 with 0.1 per cent solutions of mono- and dibasic sodium phosphates. Bacterial clumps are broken by manual shaking, the suspension is filtered through sterile cotton to remove agar particles, and an equal volume of pure glycerol is added. The optical density of the finished suspension should be approximately 0.55 as determined with the Coleman Junior Spectrophotometer in 19 x 105 mm. cuvettes at a wave length of 610. This density corresponds to 10 times the barium sulfate standard No. 1.

The agglutinability of the antigen is then tested as described below with experimental Vi, O and H antisera and with normal saline. If no agglutination occurs with O and H antisera and with saline, and if the end-titer with Vi immune serum is satisfactory, the antigen is now ready for use in the detection of Vi agglutinins in unknown sera.

Performance of the Test—In the hollow of a glass slide, such as that used for flocculation tests for syphilis (Clay-Adams A 1474 X), 0.03 ml. of each serum to be examined is placed; a similar quantity of antigen is mixed with the serum. The slide is agitated 4 minutes on a shaking machine (Kline agitator), then left at room temperature 30 minutes and resulting agglutination is read under a stereoscopic microscope at a magnification of 72. A positive agglutination appears as yellowish clumps in a clear background; if negative, bacteria form a homogeneous veil covering the total surface, hardly visible. All sera positive at dilution 1:2 are diluted 1:5, 1:10, 1:20, etc., and retested by the same method to determine the final titer.

RESULTS

From October, 1946, to August, 1950, a total of 10,912 sera were examined. These specimens were submitted to Felix's qualitative serodiagnosis and also to the Vi agglutination test.

These sera were divided into four groups: normal sera, sera from vaccinated persons, from carriers, and from clinical cases of typhoid, as indicated in Table 1. The term "normal sera" means sera from patients suffering from an infection other than typhoid or from individuals investigated by routine tests for the detection of carriers. Of 9,192 such sera, 9,082 (98.8 per cent) were negative and 110 (1.2 per cent) gave a positive Vi agglutination test. Among 1,164 vaccinated persons, 1,143 or 98.2 per cent gave a negative result and 21 or 1.8 per cent were found positive. During this study, 530 sera from bacteriologically proved cases of typhoid were examined. Our results show that 450 (85 per cent) had no demonstrable Vi agglutinins and 80 (15 per cent) showed a significant titer of these agglutinins. The sera from 26 confirmed carriers, i.e., from whom it was possible to isolate *S. typhosa*, all contained Vi antibodies.

TABLE 1

Results of Vi Agglutination Tests for Detection of Vi Antibodies (Total 10,912)

Sera	Positive								Negative		Total
	+		++		+++		Total positive				
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.
Normal	59	0.64	22	0.24	29	0.32	110	1.2	9,082	98.8	9,192
Vaccinated	14	1.2	3	0.3	4	0.3	21	1.8	1,143	98.2	1,164
Cases	24	4.5	18	3.4	38	7.1	80	15	450	85	530
Carriers	4	16	5	20	17	64	26	100	0	0	26

+ = weakly positive (Dilution 1:2)
++ = positive (Dilutions 1:5 and 1:10)
+++ = strongly positive (Dilution 1:20 or more)

Interpretation of Results—Experience with thousands of sera has led us to conclude that sera showing agglutination with dilution 1:2 only can be considered weakly positive (1+), that agglutination in 1:5 or 1:10 dilution indicates a positive result (2+), and that agglutination in 1:20 or higher indicates a strong positive reaction (3+). Our observations and those of Gunther[9] show that this technique eliminates the prozone phenomenon reported by Coleman[5] where fresh potent Vi sera give a negative or partially positive reaction at low dilutions when tested in tubes with living Vi cultures.

PRACTICAL VALUE OF THE TEST

The practical value of this test has been demonstrated by various workers. The following particulars secured

through the collaboration of Dr. Gustave Charest, Epidemiologist of the City of Montreal, are of interest in this connection.

Miss P. D., aged 16 years, of Montreal, was reported as a case of typhoid in August, 1948, because of a positive Widal followed by a positive blood culture for *S. typhosa*, type C. The inquiry, revealing that her mother had had typhoid some years before, indicated her as the probable source of infection. In fact, this person's serum gave a positive Vi reaction and subsequent feces examinations led to the isolation of a typhoid bacillus, type C.

In December, 1945, our laboratory isolated a typhoid bacillus, type E_2, from the feces of a young child. Two adults, the mother and a cousin living with the family, were suspected, especially the latter who had had typhoid the year before. However, the Vi test of the cousin's serum was negative, but the serum from the mother was positive and type E_2 bacilli were isolated from her. Curiously enough, the mother could not remember ever having suffered from typhoid fever.

A few days after a sojourn at Lake Placid, N. Y., Miss C. was a victim of typhoid. Her father, who had suffered from typhoid in 1910, was suspected. A Vi test of his serum was completely negative. However, the mother's Vi agglutination test was positive, and subsequently *S. typhosa*, type E_1, was isolated. A more intensive investigation revealed that this person had a history of typhoid in 1918.

Lastly, Miss J. M., adopted daughter of Mrs. L., suffered from a typhoid infection, type B_2. Knowing that the mother had had typhoid during the epidemic of 1927 in Montreal, the epidemiologist rightly suspected her. The suspicion was confirmed by a positive Vi test and isolation of *S. typhosa*, type B_2. Unfortunately, this person refused to believe she was a carrier and, 6 months later, probably transmitted the infection to her 5 year old niece. In this last case type B_2 was again isolated.

COMMENTS

Results in Normal Individuals—A critical review of the literature concerning the value of this test leads to some confusion. Decided variations in specificity are noted, dependent on the different methods used. In several papers, studies on the distribution of Vi antibodies in normal sera are omitted or based on an insufficient number of specimens. Our experience on more than 9,000 sera indicates that these antibodies are rarely present in normal individuals. If the agglutinin content characteristic of the serum of typhoid carriers, i.e., the presence of both Vi and H agglutinins,[6-9] is considered in relation to our 110 normal individuals who gave positive Vi agglutination tests, 59 can be excluded as not possessing H agglutinins. The specificity of the test is thus markedly increased, as the presumably false-positive proportion is reduced from 1.2 per cent to 0.6 per cent, which should be considered satisfactory for a serological test. The presence of both Vi and H agglutinins in apparently normal sera can probably be partially explained by the fact that non-excretory carriers may give a positive Vi test. Supporting this concept, Felix[20] reports a positive reaction in a patient suffering from an empyema of the rib caused by *S. typhosa*.

The observation of significant Vi titers in apparently non-carrier sera is due to a phenomenon, the mechanism of which is still obscure. Various theories have been advanced to account for it: 1. These Vi agglutinins may be nonspecific, as perhaps are low O antibodies found in normal sera; 2. The Vi agglutinins may be the result of an anamnestic stimulation, by a febrile disease, of residual traces of Vi antibodies from previous contact with the typhoid bacillus or its products; 3. The presence of

salmonella, paracolon, coliform and perhaps other bacteria possessing a Vi antigen and thus able to produce Vi antibodies in individuals free from typhoid.

Results from Vaccinated Persons—As expected, our results convey the impression that antityphoid-paratyphoid vaccines used in the Province of Quebec, mainly Connaught Laboratory and Montreal Microbiological Institute vaccines, contain little or no Vi antigen. Our positivity of 1.8 per cent appears to be chiefly a function, not of vaccination itself, but rather of the general Vi content observed in the non-vaccinated normal population. If the protective value of Vi antigen is accepted by immunologists and an effective method of preservation of this antigen in T. A. B. vaccine leads to its universal use, there is no doubt that the value of Vi antibodies in carriers' sera will have to be reassessed. Until then, it appears that present immunization procedures do not constitute a serious source of error in the interpretation of positive Vi reactions.

Results in Cases—According to Bhatnagar,[14] Vi antibodies are found in all clinical cases of typhoid provided sufficient serological tests are performed at regular intervals. A search of the available literature reveals that this concept is not fully supported by the results obtained, some workers finding the antibodies in 50 per cent of the cases, some even less frequently. In our series of 530 cases, positive Vi reactions were obtained in 15 per cent. The negative group is undoubtedly partly due to insufficiently frequent examination of our patients, one or two specimens being submitted either too soon or too late. In view of its irregular appearance, Vi antibody seems to be of only very limited value in the diagnosis of typhoid fever.

An interesting feature of this study is the fact that more than 75 of our cases were treated with intravenous Vi bacteriophages.[21-22] As these phages were propagated on *S. typhosa* strains rich in Vi antigen, one might expect the formation of Vi antibodies in these patients' sera. However, Desranleau reported that such is not the case. In 12 cases particularly well followed, 2 had Vi antibodies before phage therapy; after completion of treatment, these 2 patients' Vi antibodies had the same titer and the 10 others showed no Vi antibodies in a dilution of 1:2. Experimental data obtained after immunization of rabbits with concentrated phages (total dosage 2.6×10^{10} particles) confirm these findings. Neutralizing phage sera I, II, III, IV, V, and VI did not agglutinate Vi suspensions, but agglutinated O and H antigens to very high titers. This study also demonstrated that the Bhatnagar Vi I strain may not be a pure Vi strain as phage lysates of this strain do not produce Vi antibodies, but O and H antibodies only.

Results in Carriers—Positive Vi reactions in our 26 carriers confirm the great value of this test for the detection of carriers. All these sera contained Vi and H agglutinins; a few contained O agglutinins as well. Usually, Vi agglutination titers are higher in carriers than in normal individuals. However, 4 of our carriers had a titer of only 1+ (dilution 1:2) whereas 29 of our normal sera had Vi titers of 3+ (dilution 1:20 or more). These low titers agree with Felix's[3] findings in the sera of 56 carriers, one-third of which were positive in a dilution of 1:5. Consequently, use of high threshold dilutions may result in false-negative results and a high Vi titer in a serum does not necessarily indicate that the individual concerned is a typhoid carrier.

CONCLUSIONS

A rapid slide agglutination test, using a glycerolated Vi antigen from Bhatnagar Vi I strain, is described in detail.

Results obtained on 10,912 sera from October, 1946, to August, 1950, show that this reaction offers sufficient sensitivity and specificity to warrant its use as a routine procedure in a public health laboratory. Negative results were obtained in 98.8 per cent of normal sera and 98.2 per cent of sera from vaccinated individuals. In 80 (15 per cent) of 530 clinical cases of typhoid, a positive Vi reaction was observed. The sera of 26 bacteriologically proved carriers were found to contain Vi antibodies. This serological procedure is believed to be an efficient screening test which, if positive, should be supplemented by numerous examinations of feces, urine or duodenal fluid in an effort to isolate *S. typhosa*.

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The Development of a National Water Resources Policy*

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IN January, 1950, the President of the United States appointed a (temporary) Water Resources Policy Commission. This commission consists of 7 members, 2 of whom are engineers. The remaining members might be classed under the general head of economists, although 2 of them are also agriculturalists, and 2 are also college presidents.

Immediately thereafter, the Engineers Joint Council instructed its Water Policy Panel to develop a statement of desirable national water policy and to present it to the President's temporary commission. The panel secured the assistance of some 80 members of the engineering profession, the statement of desirable policy has been prepared, and was presented to the temporary commission on June 28.

In a way, this professional public service effort, over a 6 months' period, may be considered as only an incident in the long time interest of the engineering profession in water policy. This general interest had developed in an organized fashion several years prior to the action by President Truman, and it will undoubtedly continue for a long time after the temporary commission has made its report.

The Engineers Joint Council is the coordinating organization of the 5 national engineering societies. Its Panel on National Water Policy Study was set up in 1947 at the instance of the American Society of Civil Engineers. The panel consisted of 1 representative from each of the 5 societies.

In January, 1949, this panel had completed its review of apparent present policies and procedures related to the conservation, development, and use of our national water resources. It concluded that there was, in fact, no recognizable overall national water policy; that a tremendous program of expenditure, in terms of water projects, was being carried out by the federal government, through a number of the older agencies, without any satisfactory coordination between these agencies, or between the federal government and the states; that the objectives of the various agencies were markedly different; that there was no uniformity of standards of justification, and no procedure which would determine that projects undertaken were those which were most definitely in the public interest.

With the coming of the "multi-purpose project," the whole situation had become so confused that, in the opinion of the panel, members of Congress could not possibly determine the validity of proposed projects; and for many of them an understanding of the situation could not go far beyond the fact that some one of the projects was being strongly urged by some group of constituents. The panel concluded that this matter could only be reasonably clarified and put on a sound economic foundation if Congress could be induced to set up a commission to review all present apparent policies, and to restate national water policy in

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a manner that would fully coördinate all federal water activities, with due regard to the interests of the states.

The Engineers Joint Council thereafter instructed the panel to proceed to present this situation to the proper committees of Congress. The panel had made contacts with the American Water Works Association and the National Water Conservation Conference with a view toward a coöperative presentation, when President Truman suddenly and by executive order set up his temporary Water Resources Policy Commission. The council immediately instructed its panel to prepare a statement on behalf of the engineering profession and to present it to the President's temporary commission.

The panel organized 9 task force committees and a coördinating committee. They donated the greater part of their time over a 4 months' period, and produced the document entitled *A statement of Desirable Policy With Respect to the Conservation, Development and Use of the National Water Resources.* It was publicly filed with the temporary commission prior to July 1, and has been made available by the council for general distribution.

At the present time, the task committees are standing by, prepared to review the findings of the President's commission when they are made public.

THE STATEMENT OF POLICY

The completed statement of desirable policy really consists of nine separate statements and a coördinated summary. One of the statements covers policies of general applicability, and the others cover policies particularly applicable in the fields of water supply and pollution; flood control; inland water transportation; irrigation; hydroelectric power; recreation, fish and wild life; and land drainage. There is a separate statement in the matter of collection and the summation of basic water resources information. The complete statement is contained in a volume of about 125 pages.

On the general question of our water resources and our present rate of use and development, the statement contains the following paragraphs. As to public water supplies, contrary to general public belief, there is no experience basis for the fear that the availability of water resources, surface or underground, is declining. Shortage of water is neither universal nor increasing. While facilities for development have been delayed too long, in some instances, there is little evidence to support the prophets of doom in the water resources field. Intelligent husbanding and allocation are the keys to the future.

Public money is limited in availability, and public needs such as water, highways, schools, and hospitals compete for it. It should be clear that adequate evaluation and comparison of projects is a first requirement in natural water policy implementation.

"In the present water resources situation the volume of public expenditures in the immediate future promises to exceed the current level of expenditures. As of 1948, the whole group of Federal water development projects, then under construction, is said to have involved an expenditure of funds greater than those expended for all projects in all the years preceding June 30, 1947, approximately five billion dollars. At the same time projects, not yet under construction, but already proposed by Federal agencies, will require about four times the amount now being expended for projects under construction.

"In view of the fact that expenditures for water resources development have reached such high figures, it is well to re-emphasize that the availability of money is not unlimited and that, where various needs compete for money in our national economy and welfare, criteria are essential which would permit distinguishing between the 'good' and the 'poor' undertakings. The last two decades are characterized by a surprising degradation in the application of any criteria to water resources development."

"The present rate of planning and Congressionally authorizing water resources developments is excessive and economically unsound. Adequate time should be allowed

for collection of essential data, and for determination of whether there is real need for a proposed development."

" 'Conservation and control of the waters of the United States are in the national interest, but not necessarily a function of the Federal Government. On the contrary, that which can be done by the individual should be done by him, and that which requires collective action should be done at the lowest governmental level practicable. The Federal Government should engage in the conservation and control of waters only when the collective action of all of the people of the nation is necessary for accomplishment of the objectives.' "

"To the maximum feasible extent, the beneficiaries of Federal water resources developments should be required to reimburse the Government, and hence the nation's taxpayers, for the benefits accruing directly to them. Where, nevertheless, there is subsidization, there should be complete disclosure in all details."

"So far as practicable, Federal water projects should be self-supporting."

With respect to transportation on inland waterways, it is concluded that such waterways should not be exempted from user charges. A number of inland waterway projects are in existence today that are completely devoid of any justification. No new artificial toll-free canals should be constructed, and studies should be given to the practicability of levying charges for the use of other types of navigation improvement.

"Except for meeting the needs of the Federal Government, authorizations for Federal hydroelectric power construction should be predicated upon the cash income to the Treasury from the sale of power. In any case, authorizations should fully disclose the power purpose, and should be solely by Congress itself."

"The Committee has reviewed methods of appraising benefits from recreation, and fish and wild life facilities as utilized by various agencies of government, and finds in them justification for the conclusion, that this appraisal cannot be other than unrealistic and arbitrary.

"The Committee strongly recommends that there be no monetary benefit assigned to the recreation, fish and wildlife functions of water projects, in the analysis of justification of a Federal water project, except only such income as is collectible or such contributions as will be made by state or local interests for this aspect of the project.

"The Federal Government supports recreation in a number of ways, but there exists no general statement of policy regarding the extent of its interest, and the degree to which financial participation in recreational projects is intended in future, and the conditions under which funds may be obtained. Before authorizing the expenditure of funds for recreation, either for joint cost of multi-purpose projects, or for recreation facilities auxiliary to such projects, the Congress should adopt a National Recreation Policy.

"The essence of these proposals is the fixing of the total expenditure which the United States may reasonably devote to recreation, and the specific appropriation of funds for new recreation projects. In this way, recreation projects of all kinds, including the recreation features of multi-purpose water projects, will be compared on the basis of national interest."

"The expected continuation of present trends toward higher productivity of land can provide food and fibre for the expected population growth, and improvement in national diet. From 1920 to 1945 the population increased one-third yet the acreage of cropland remained practically stationary. Increased agricultural production in the face of existing surpluses constitutes an economic liability.

"Lands awaiting reclamation through drainage and irrigation are not deteriorating, and should be regarded as a useful reserve for future needs."

"No future projects for the reclamation of land for agriculture, by drainage or otherwise, should be deemed economically feasible unless and until the needs have been clearly demonstrated."

Turning in somewhat more detail to the field of primary interest to this organization, Task Force Committee No. 1 consisted of 9 members as follows: L. H. Enslow, L. R. Howson, S. T. Powell, A. D. Weston, A. M. Rawn, J. C. Frye, J. H. Allen, M. B. Cunningham, R. E. Lawrence, and F. W. Mohlman. This Task Committee presented 7 principal conclusions and supported them in a 32 page discussion, with the conclusions as follows:

1. The use of water resources for domestic and industrial purposes is believed to be the highest and best use. Without adequate

water supply properly safeguarded against pollution, urban life cannot exist.

2. The use of water resources for domestic and industrial purposes is also the only universally distributed use. In this respect it is unlike irrigation or hydroelectric or flood detention which are limited in area of development.
3. Although nation-wide in development, domestic and industrial water supply present essentially local community problems. Of the 13,000 public water supply systems serving 85,000,000 people in the United States with approximately 15,000,000,000 gallons of water per day, nearly all are intrastate. Only a few have interstate problems, and a very limited number are concerned with more than two states.
4. Urban or private industrial water supplies should accordingly be built and paid for by those using the service. The cost of water from public supplies, which is usually less than 2 cents per capita per day, is within the economic reach of all.
5. Since the domestic and industrial water supplies are of such prime importance it necessarily follows that pollution of water resources must be so controlled as to make it practicable to provide a water of satisfactory quality as well as adequate in quantity.
6. Pollution of water should be regulated at the lowest governmental level adequate for the particular situation. Some will be wholly local, some at state level and some at state compact level. Federal jurisdiction and participation should be limited to the administration of existing laws; to research, investigation, and guidance upon which sound state laws and local regulations may be based, with as much uniformity as is consistent under the variable conditions encountered.
7. On dual or multi-purpose projects involving public water supply, the local community should pay its fair proportion of the cost, and the project only then be carried forward if the remaining part of the cost, to be provided from federal funds, has a proper cost-benefit ratio.

There are two specific matters which should be emphasized at this time. First, practically every one of the separate Task Committees included a recommendation for the establishment of a Board of Impartial Analysis at the federal level. It would be the duty of this board to analyze objectively all water proposals in terms of their need, their economic justification, and their priority. This board might either report publicly to the President or to the Congress. This board itself would have nothing to do with the initial clarification and restatement of water policy. Its function would involve analysis and report as to whether proposals were or were not in accordance with such policy.

Finally, you may expect me to say something in the matter of the Valley Authority versus Federal Departmental controversy. The panel concluded that this was a secondary and somewhat minor matter compared to the overall question of the establishment of sound basic policy, and that the administrative phase should not be approached until basic policy itself had been fully restated. I personally feel that, if the Congress can be induced to review, redevelop, and clearly restate a national water policy, most of the arguments for a Federal Department of Public Works on one hand, or for covering the country with Valley Authorities on the other, would disappear.

Longevity of the Industrial Worker*

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FORTY years ago, about the time that the Metropolitan Life Insurance Company began to study intensively the mortality of American wage earners and their families, the country was shocked by conditions under which many workers earned their daily bread. The reports of Hamilton, Hayhurst, and other pioneers in industrial hygiene made unpleasant reading. Measured even by the relatively low standards of the day, the lot of the average wage worker was hard. Accidents, crowded working conditions, bad plant sanitation, uncontrolled dusts, fumes, and gases took a heavy toll. Long hours of work and low pay were the order of the day, making the worker an easy prey to tuberculosis and other infectious diseases to which he was exposed in his off hours as well as while at work. Small wonder then that death rates of workers were high and their lives relatively short.

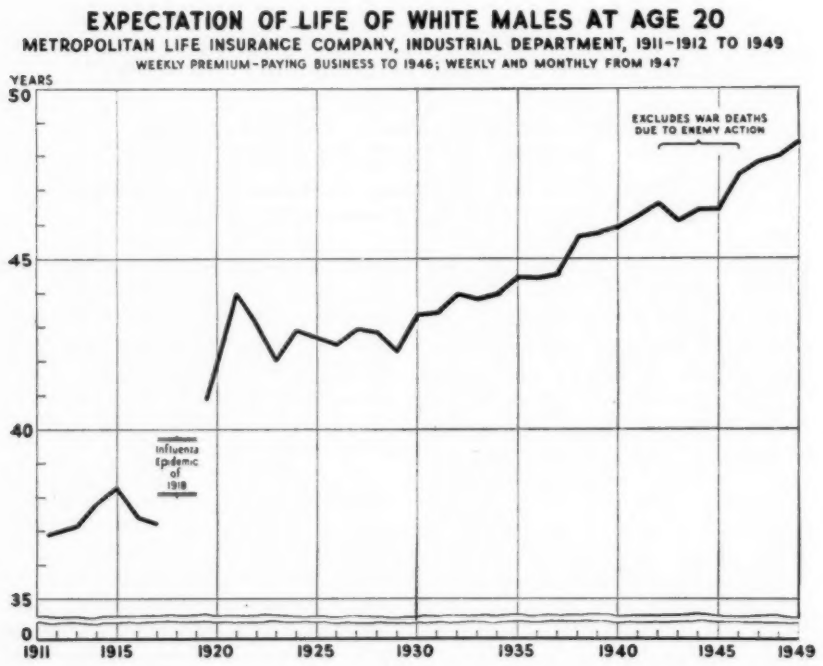
In the four decades which have passed, the health of workers has received the attention of an increasing number of physicians, engineers, chemists, and other technicians. Today, industrial medicine is a well organized and recognized specialty devoted to meeting the health problems of workers. The safety movement has spread rapidly, with the result that our knowledge of the causes of accidents and of the means to prevent them has been greatly increased. Workmen's Compensation legislation gave impetus to advancing both the safety and the industrial hygiene movements. Industrial plants, on a huge scale, have been built to give the worker more light, air, and better working conditions in general. Hours of labor have been shortened and the economic status of the worker vastly improved.

All these gains, together with the benefits from the general advances in medical science and sanitation from which workers have benefited along with others, obviously have resulted in a profound inprovement in the mortality and longevity of wage earners. In this brief report, it is our purpose to discuss the broader aspects of the longevity of a particular group of industrial wage earners, i.e., adult white male policyholders insured in the Industrial Department of the Metropolitan Life Insurance Company, for whom a continuous record of mortality covering a period of 40 years is available.

These policyholders, it should be explained, live almost altogether in cities and towns of the United States and Canada. Virtually every occupation is represented among them, but for the most part they are engaged in urban wage-earning occupations. They constitute a fairly homogeneous social and economic group. Notwithstanding some important shifts in the proportional representation of individual occupations, caused by major national readjustments in industry over the years, and an increasing tendency for the better paid workers to purchase Ordinary rather than Industrial

* Presented at a Joint Session of the Industrial Hygiene and Statistics Sections of the American Public Health Association at the Seventy-eighth Annual Meeting in St. Louis, Mo., October 31, 1950.

CHART 1



Life insurance, the general occupational complexion of the group has not greatly changed.

The average industrial wage earner aged 20 starting out on his industrial career today, can look forward to 48.4 additional years of life and to attainment of age 68; about forty years ago, a worker of that age might have expected to live only 36.9 additional years and reach age 57. Thus, in little more than one generation 11½ years have been added to the expectation of life at age 20. It would be difficult to estimate all the blessings flowing to countless families and to the nation as a whole from the addition of that many years to the life of the average worker. This is particularly true since so much of the gain has resulted from reduced mortality at the time of life when his family obligations are greatest. An encouraging aspect of the picture is that the improvement in life expectation has been continuous. Even so short a time ago as 1940, the expectation of life of a worker aged 20 was 2½ years less than it was in 1949.

Notable gains have been made at every working age during this 40 year period. At age 30 the expectation of life in 1949 was 39.06 years, 9.7 years more than in the earlier period; at age 40 the expectation was 29.94 years, a gain of 7 years; at 50, 21.77 years, a gain of 4.8 years, and at age 60, 14.90 years, a gain of 3.4 years. Chart 1 shows the trend in the expectation of life at age 20 of white male Industrial policyholders over the period 1911–1912 through 1949 and Table 1 shows the expectation of life at the beginning and at the end of the series for each tenth year of life, ages 20 to 60. The average number of white male lives exposed in 1911–1912

TABLE 1

Expectation of Life of White Males at Decennial Ages, Metropolitan Life Insurance Company, Industrial Department 1911–1912 and 1949

Age	Expectation of Life in Years 1949	1911–1912	Increase: 1949 Since 1911–1912
20	48.40	36.87	11.53
30	39.06	29.36	9.70
40	29.94	22.94	7.00
50	21.77	16.98	4.79
60	14.90	11.50	3.40

Number of white males at ages 20 and over (premium-paying)
1949—3,816,000
1911–1912—1,506,000

TABLE 2

Expectation of Life of White Males at Decennial Ages, Metropolitan Life Insurance Company, Industrial Department Compared with General Population of the United States 1948 and 1911–1912

Age	1948 Expectation of Life in Years M.L.I. Co.	U.S.	Difference: U.S. Minus M.L.I. Co.	1911–1912 Expectation of Life in Years M.L.I. Co.	U.S.*	Difference: U.S. Minus M.L.I. Co.
20	47.97	48.97	1.00	36.87	42.71	5.84
30	38.64	39.79	1.15	29.36	34.87	5.51
40	29.58	30.74	1.16	22.94	27.43	4.49
50	21.46	22.44	0.98	16.98	20.39	3.41
60	14.61	15.40	0.79	11.50	13.98	2.48

* Original Registration States, 1909–1911.

was 1½ million and in 1949 nearly 4 million.

Despite his marked increase in life expectancy in recent decades, the white industrial worker has a higher mortality and shorter life expectation than other workers, although the difference is now far less than it was about 40 years ago. Taking for comparison the expectation of life at various ages of adult white males of the general population who include in their number far larger proportions of agricultural workers and white collar workers than does the Industrial group, we find that in 1948 they had an expectation of life at age 20, one year more than industrial male policyholders of that age. About four decades earlier, the difference in favor of the average white male of the general population was nearly 6 years. Similarly, at other working ages the expectation of life of white males of the general population is more than that of the industrial male, but at every age the gap has been narrowing, as will be seen in Table 2.

The disadvantage of the industrial wage earner in respect to longevity is more clearly defined when comparison is made with white rural dwellers, most of whom are employed in agriculture and with a group of males insured under Regular Ordinary policies among whom white collar workers—clerks, professional men, merchants, and salesmen—make up a far larger proportion of the insured than is true of Industrial policyholders. Very few Regular Ordinary policyholders are engaged in hazardous occupations. Somewhat higher standards of physical fitness, it is true, must be met for acceptance for Regular Ordinary than for Industrial insurance, and this too affects the comparison. Such selection, however, affects mortality, chiefly during the first five years of insurance. In order to eliminate as far as practicable the effects of such selection

on the comparability of the life expectancies for the two groups of insured white males, the expectation of life for Ordinary risks has been computed from the mortality experience on policies in force over five years.

Unfortunately, the latest year for which data are available for Ordinary policyholders and for rural males is 1939. As will be seen from Table 3, males insured in the Ordinary branch had the highest expectation at age 20, just 50 years, or 4¼ years more than the Industrial white male policyholders; rural white males had an expectation of 3¾ years more than the Industrial policyholder; white males in cities of less than 100,000 population, 1¼ years more, and males in the larger cities, one-quarter of a year more. It is significant however that the difference in expectation at age 20 between Ordinary and Industrial white males in the years 1911–1912 was more than 8 years. Moreover, although the expectation of life at age 20 for both Ordinary male policyholders and white males of the general population had increased by about 5 years in the period 1911 through 1939, the gain in expectancy for Industrial policyholders during this period was nearly 9 years. Here is a striking indication of how much more rapidly the mortality had declined among wage earners than among other workers in the prewar period.

The increased longevity of the Industrial worker reflects the phenomenal reduction in the mortality from a number of causes, some of which, notably the respiratory diseases, years ago took a large toll. In the main working ages, 20 to 64 years, the age-adjusted death rate of white males in 1948–1949, 6.7 per 1,000, was only about two-fifths of what it was in 1911–1912, namely, 17.4 per 1,000. Spectacular has been the decline in the death rate from tuberculosis in this period—from 433.5 per 100,000 to 42.3, a drop of more than 90 per cent. Influenza and pneumonia mortality has been reduced almost as much as that from tuberculosis, and the mortality from accidents has declined 56 per cent. The large group of cardiovascular-renal diseases declined one-third, and diabetes also declined by about one-third. Cancer mortality, however, has increased 25 per cent. Very likely the increase can be attributed in the main to improvement in diagnosis which resulted in reporting many deaths as due to cancer which earlier would have been ascribed to some other cause. Certain other diseases, such as typhoid fever and lead poisoning, which took the lives of many industrial workers, have become insignificant. Death rates from the principal causes of death in the years 1911–1912 and 1948–1949, together with the per cent change are shown in Table 4.

All in all, the gains in expectation of life of industrial workers and the declines in mortality from the more important diseases and conditions present an encouraging picture. It would be of great value if we could accurately appraise the specific factors that have brought about this improvement. Unfortunately, this is not possible. Obvi-

TABLE 3

Expectation of Life of White Males at Age 20 Metropolitan Life Insurance Company and General Population of the United States at Specified Period

	Metropolitan Life Insurance Co.	
Period	*Weekly Industrial Department*	*Regular Ordinary Department* *
1939	45.74	50.00
1911–12	36.87	45.00
Gain	8.87	5.00
Period	*United States, Total*	
1939–41	47.76	
1909–11 †	42.71	
Gain	5.05	
Area	*United States, 1939*	
Cities of 100,000 or more	45.97	
Other urban	46.97	
Rural	49.49	

* Excludes monthly premium debit policies and policies in force less than five years. Includes all males.
† Original Registration States.

TABLE 4

Death Rates per 100,000 for White Males at Ages 20–64, Metropolitan Life Insurance Company, Industrial Department 1911–1912 and 1948–1949

Cause of Death	Death Rate per 100,000 * 1911–1912	1948–1949	Percent Change: 1948–1949 Since 1911–1912
All Causes of Death	1738.2	670.6	−61.4
Typhoid Fever	25.0	.1	−99.6
Pneumonia and Influenza	157.9	17.8	−88.7
Pneumonia		17.1	
Influenza		.8	
Tuberculosis	433.5	42.3	−90.2
Cancer	78.1	97.8	+25.2
Diabetes	16.1	10.6	−34.2
Cardiovascular-renal diseases	451.4	301.3	−33.3
Cerebral hemorrhage		34.2	
Disease of coronary arteries and angina pectoris		129.6	
Other chronic heart diseases		114.0	
Chronic nephritis		23.4	
Accidents—All forms	160.3	70.4	−56.1
Occupational accidents		17.1	

* Adjusted for age on the basis of the Standard Million of England and Wales.

ously, the elimination of certain occupational health and accident hazards and the control of others have played an important part. Other factors, social, economic, medical, etc., may have been even more important. This conclusion is suggested by the fact that the mortality rate of white female Industrial policyholders, the wives and sisters of the male policyholders, who have the same home environment but who are not exposed to serious industrial hazards has declined faster than the rate for males. Between the periods 1911–1912 and 1948–1949 the age-adjusted rate for white female policyholders declined 68.9 per cent as compared with a decline of 61.4 per cent for the males.

Our inability to assess the specific factors involved in the improving mortality and longevity of the industrial worker points up one of the great deficiencies in our vital statistics, the lack of comprehensive data on mortality by occupation. A series of death rates by cause of death and age for men in particular occupations would be of great value to those concerned with industrial health, in focusing attention on those occupations of high mortality and possibly to the particular conditions responsible for the excess. Such statistics would be of special value to workers in the field of cancer prevention and in the prevention of other diseases.

A complete study of ocupational mortality would make it possible to answer many important questions that are cropping up all the time and for which there is now no answer. What has been the overall effect of the measures instituted to control the hazard of silica dust on the mortality from tuberculosis and from other causes among granite cutters, tunnel and subway workers, sandblasters, and other workers exposed to this hazard? What are the effects, if any, on the total mortality and the mortality from specific causes of workers exposed to inorganic dusts not containing free silica or asbestos? Has the mortality from pneumonia among iron and steel mill and foundry workers been markedly reduced by the use of new drugs? What, if any, are the effects on the mortality of exposure to radiations to which workers in the field of nuclear fission are exposed? Are there other classes of workers exposed to unsuspected dangers to life such as the chromate workers

who quite recently were discovered to have an inordinate mortality from cancer of the lungs? The obvious dangers we soon learn about and correct, but the insidious dangers which may be associated with work in many industries are easily overlooked and may be revealed only through extensive and detailed occupational mortality and possibly occupational morbidity studies.

One cannot stress too strongly and, apparently, too often the urgent need to secure comprehensive occupational mortality statistics in connection with the 1950 Census. Individual states should coöperate to the full with the National Office of Vital Statistics in this project and make detailed analyses of their own material giving special attention to conditions in the industries peculiar to their part of the country. We are fully aware of the difficulties of the problem of securing mortality data of this kind but a start must be made even if the results leave something to be desired in the way of complete accuracy. Imperfect though our deductions may be, they may result in important discoveries leading to improvement in the health and longevity of the worker.

New York's Fluoridation Control

According to the March, 1951, issue of the *New York State Health News*, the New York State Department of Health has recommended that cities and villages fluoridate their potable water supplies, subject however to the ability of the municipalities to provide adequate control measures in accordance with requirements set forth by the department. A digest of these requirements follows:

Approval of the State Commissioner of Health is required before compounds can be added and the state must be satisfied that adequate control will be carried out. The owner or operator of the water supply is responsible for the provision of accurate feeding equipment. Accuracy of dosage within 10 per cent is required. Special precautions must be taken to protect the operator from inhaling dust containing fluorine compounds and operators must be provided with individual respirators and rubber gloves.

The treatment process must be so controlled that the maximum concentration of fluorine in the treated water does not exceed 1.5 p.p.m. at any time. The health officer having jurisdiction has been designated as the person to supervise the concentration of fluorine in the treated water. He must arrange for the collection of samples and for the chemical analyses in a laboratory approved for this purpose by the Commissioner. The owner or operator is responsible for the collection and testing of the samples as often as the Commissioner of Health prescribes. Accurate daily records must be kept on forms supplied by or approved by the State Commissioner of Health and must be submitted monthly.

New Patterns in Industrial Health and Medical Care Programs in California*

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THE techniques of industrial hygiene have developed to a high degree, and their application in the prevention of occupational injury and disease is steadily increasing. Similarly, the growth of medical care plans available to industrial workers and their families is something of a modern phenomenon. Yet, there has been only incidental coördination of the preventive health programs with the more recent therapeutic services. The potentialities for more effective health protection of the working population are tremendous if these parallel lines of public health can be merged.

New opportunities for closing this gap are now provided by a highly significant recent trend in labor relations. Since this development also poses new problems in the national health scene, it is important that we, in public health, become familiar with its general pattern. Our reference is, of course, to the increasing array of employee welfare benefits negotiated under collective bargaining. To what extent have preventive health measures been included? What is the scope of the medical care provisions? Will these labor-management agreements promote or further fragment the health services for industrial workers?

Considerable activity in this area of collective bargaining is under way in California. A review of the major developments should be generally valuable.

Health and Safety Provisions in Industrial Agreements

Throughout modern history, improvements in working conditions have substantially contributed to the public health. The eight hour day, for example, has probably had as basic an influence on present American life expectancy as has the adoption of elementary sanitation practices. The effects of improvement in wages, vacations, rest periods, and other amenities have also had a salutary effect on the health of the population.

The origin of the U. S. Public Health Service as a medical service for the merchant marine illustrates the long history of organized health programs for specific labor groups. In the years of the Civil War, the American Miners' Association, a predecessor of modern miners' unions, made health a political issue by asking candidates for public office to pledge support of the miners' demands for minimum health and safety standards to be enforced by public inspection.[1] Parenthetically, it was not until 1941 that the coal industry finally agreed to consider health-hazardous conditions as legitimate grievances to be discussed with the union.[2]

In 1911, after a strike in the New York sweatshops, employers and em-

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ployees jointly set up a system of inspection for sanitation and other health conditions. Out of this, developed a study of health of garment workers conducted by the newly created Office of Industrial Hygiene and Sanitation of the U. S. Public Health Service, which subsequently resulted in the creation of the well known Union Health Center. This represents one of the early forerunners of the current collective bargaining welfare agreement.

Safety has had a considerable history in industrial negotiations. In 1942, a U. S. Department of Labor analysis of 7,000 union contracts showed that 2,500 contained some provision for health and safety on the job.[3]

While many collective bargaining contracts contain mere perfunctory statements to the effect that "the employer shall make reasonable provisions for safety and health . . . ," an increasing number show a positive interest in health and a considerable awareness of the job hazards peculiar to the industry. A few examples of recent contracts negotiated in California show the possibilities in this approach.

The agreement of The Brotherhood of Painters in San Francisco, concerned about preventing dermatitis, specifies that "No member shall be required to wash out brushes . . . in any material other than that approved by the State Health Authorities." In an effort to prevent lead and other chemical poisoning, the same contract spells out a series of precautions to be followed in the spraying of paint.

In one of the large lead smelters, the Mine, Mill and Smelter Workers' Union has negotiated a contract which provides for periodic tests for the presence of lead absorption and poisoning, and for the periodic physical examinations of all employees. Here, again, the employer and employees agreed to adopt certain procedures (those for detecting lead poisoning) which were recommended by the state industrial health agency. This represents a striking departure from traditional union opposition to company medical examinations.

The Pacific Coast Marine Safety Code, developed earlier by the employers, has been incorporated as an integral part of the union contract. It embraces a most detailed code ranging from "good housekeeping" to "personal protective equipment." The agreement further establishes joint employer-employee safety committees in each port. A provision whose implications are even more far-reaching, states, "No longshoreman shall be required to work when in good faith he believes that to do so is to immediately endanger health and safety."

Thus, recent history has clearly brought into the industrial picture a new and potentially important ally to the industrial hygienist, the safety engineer, the industrial physician, and to public health in general. The collective bargaining contract offers a positive mechanism whereby management and labor can agree to promote sound principles of job safety and disease control.

While some advances in preventive service have been realized through these union-management agreements, only rarely are they coördinated with the newly developing medical care plans for the working population. These in turn seldom include measures for the prevention of illness and the promotion of positive health. Yet, if comprehensive in scope, the medical service arrangements *can* promote many important public health principles.

Medical Care Provisions Under Collective Bargaining

By far the most prominent of recent industrial "welfare" negotiations has been the provision of some form of prepaid medical care for non-occupational illness. Although forward-looking employers and unions have developed various types of medical care programs since

the turn of the century, the establishment of such plans through collective bargaining is a relatively new phenomenon. Only eight years ago, a bulletin of the U. S. Department of Labor stated:

> Traditionally, unions have never been enthusiastic over insurance or pension plans on a company basis, and in some instances have actively opposed them. . . The basis for this opposition lies in the inherent nature of such plans—that is, the necessary continuance of the employment relationship with the company in order to receive the benefits. . . While opposed to company plans, organized labor actively participated in securing governmental pension programs, such as are provided by the Railroad Retirement Act and the Federal Social Security Act. . . With the passage of this legislation in 1935, the impetus for company-wide pension plans has declined. . .[4]

Seven years later, however, another bulletin of the Labor Department could emphasize the extraordinary growth of health and welfare agreements under collective bargaining,[5] which today affect some four to five million workers. The origins—in fraternal benefit societies and in employer sponsored group insurance contracts—are still reflected in current cash indemnity patterns. Some of the earliest direct service programs, such as the International Ladies Garment Workers' Union Health Centers and the employee-benefit plan of the Consolidated Edison Company, have also been incorporated in more recent collective bargaining agreements.

The movement has had its major impetus since World War II, following the wartime "wage freeze" and the 1945 ruling of the War Labor Board in support of employee-benefit provisions in collective bargaining. Spurred on by the lack of health and disability insurance and the inadequacy of retirement and survivors' benefits under the Social Security Act, increasing numbers of unions have been led to negotiate for their own "welfare" benefits. With the inclusion of such provisions in the collective bargaining agreements of such major unions as the United Mine Workers, the United Auto Workers, and the United Steel Workers, the movement has become a significant social and political force.

Existing health plans under collective bargaining fall into three general categories:

1. Cash-benefit group contracts with commercial insurance carriers.* This is by far the largest group.
2. Limited service contracts, primarily with Blue Cross and Blue Shield plans. This is a rapidly growing category, now the second in size of the three.
3. Comprehensive service † contracts with individual or grouped physicians and hospitals.‡ There are comparatively few workers now covered by this type of plan.

These three general methods of providing medical benefits under collective bargaining differ in many respects. The weakness and strength of each deserve comment.

The commercial group insurance contracts for cash benefits have the important advantages of being flexible, applicable in design to any locality, and capable of satisfying the desires of large industries for uniform coverage of widely scattered workers. However, benefits are in cash, not health service, and are usually limited to specified items during hospitalization. Thus, these policies fail to promote the maintenance of good health on the job, or the early detection and control of incipient illness. The dollar payments are, moreover, often below the actual costs to the worker of medical service needed, and may not find their way to the doctor or hospital. No provision is made, of

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* Some larger unions, such as the Amalgamated Clothing Workers of America, operate on a self-insured basis.

† Throughout this discussion the term "comprehensive service" is used (somewhat loosely) to refer to physicians' care in the home, office, and hospital, hospitalization, x-ray, and laboratory service, physiotherapy, and some nursing and drug benefits.

‡ A few unions (such as the United Retail, Wholesale and Department Store Employees Union in St. Louis) and some companies (such as the Western railroad systems) have established their own medical staffs and facilities for the provision of health services to the workers.

course, for improvement in the quality of medical care. Consumer representation in policy making is seldom possible.

The limited service benefits of Blue Cross and Blue Shield plans offer certain advantages. They pose no great administrative problems for the welfare fund, permit wide choice of individual physicians and hospitals, and do provide necessary personal services during serious illness at the standards of quality prevailing in the area. Such plans are non-profit and can return the greatest part of the premium in the form of benefits. In recent months, special arrangements among the various independent Blue Cross plans have made possible the writing of uniform contracts for large interstate industrial groups.

However, the limitation of service benefits to in-hospital care for relatively short time periods,* and the recent trend toward "dollar benefits" rather than medical service, prevent many of these programs as now constituted from satisfying the criteria of adequate health care. Preventive and early diagnostic services and care for chronic illness must usually be excluded. The use of individual doctors and hospitals makes it difficult for these plans to control the standards of service. Relations with industrial hygiene and safety programs are not easy to develop.

The provision of "comprehensive" services, particularly through group practice teams in medical centers, can afford the industrial employee and his family more in the way of general health protection than is possible under the simple insurance plans. Certain definite features, however, must be recognized. The workers must obtain their medical care from specific groups of physicians in particular locations. Since there are relatively few group medical centers now in operation, the interested union must either have such facilities already accessible to its membership or must stimulate the development of new units. Arrangements with individual practitioners and hospitals, as in the United Mine Workers' plan, do avoid this problem, but thus forego the advantages of group medical practice. Finally, there is no assurance—except in coöperatives or certain community projects like the Health Insurance Plan of New York—that the group clinic contract affords any real policy voice to the consumer.

The basic advantage of this approach, however, is the emphasis on prevention and early diagnosis. Health education, home nursing service, periodic check-ups, care at the beginning of disease—all can be promoted to the financial advantage of the program that prospers when its members stay healthy. In New York, one large group practice plan is able to set up an experimental project in family health maintenance, while a similar service plan in California can make arrangements for conducting a multiphasic screening survey—with therapeutic follow-up—of a large group of industrial workers.

The very real economies of full-time medical staffs, of coördinated equipment and facilities, and of preventive care make possible extended periods of service and low relative costs. Perhaps most important is the opportunity for improvement in the general *quality* of care. This can result from the coördination of general physicians, specialists, and auxiliary personnel in well equipped health centers, as well as full range of services included in the benefit structure.

None of these plans, by themselves, satisfies all the health needs of the working population. Their very tie-in with labor negotiations restricts the benefits to members of particular unions (often without their families) during periods of continuous employment. The need for health services available to all families,

* A few plans, such as the medical society plans in the Pacific Coast States, do provide for certain home and office care.

maintained through periods of unemployment, job changes, and variations in labor-management relations, is sometimes obscured by dramatic negotiations under collective bargaining. Even those whose scope of benefits permits preventive medicine to be emphasized are seldom coördinated with occupational health and safety activities on the job.

Moreover, most of the medical care plans, including many of those giving "comprehensive" direct service, operate in complete isolation from workmen's compensation programs. In the great majority of instances a legal and financial wall separates the practice of medicine into synthetic compartments: one for occupational and the other for non-occupational conditions. The history of industrial medicine is replete with instances of conditions assumed to be non-occupational which are later proved to be of occupational origin. One can also surmise how much more effective the total industrial health program would be if the doctors providing medical care also visited the plants in which their patients work, performed the regular preventive services such as pre-placement and periodic physical examinations, and provided a coördinated medical service for all disabilities!

While none of the existing types of employee-benefit programs satisfies all the health needs of industrial workers, it seems clear that the comprehensive service plans afford the best opportunities for linking prevention with treatment in industrial programs. Recent trends in health and welfare provisions under collective bargaining in California illustrate the increasing recognition of these values by both management and labor.

Newer Patterns in California

California is fortunate in that more than the average number of medical group practice and full-service prepayment plans are available to industrial groups. There are currently some 50 group medical clinics in the state which satisfy the criteria of true group practice, of which about ten have developed relatively complete prepayment plans of their own.[6]

At the same time, increasing numbers of unions are including health benefits in their collective bargaining demands. A recent survey by the State Division of Labor Statistics indicates the status of health benefits in collective bargaining agreements in California.[7] Among 1,707 contracts analyzed, 191 included some type of welfare provision, and of these 123 contained health benefits. These 123 plans involved some 112,000 workers, or about 10 per cent of the union membership of the state * (see Table 1) Since this study was made in February, 1950, there have been some 25 additional union agreements, which have involved large unions and a much higher proportion of all workers.

Table 2 indicates the types of medical coverage in the 123 reported union health plans. About 83,000 workers (74 per cent) were covered by 91 commercial insurance policies; some 15,000 workers (14 per cent) were included in 11 Blue Cross contracts; and about 13,000 (11 per cent) were involved in 11 group-practice plans. This latter group has greatly expanded in the past 8 months, as an equal number of additional workers — plus their families — have doubled the number covered by welfare fund contracts with group medical centers.

It is the experience of this expanding latter group which is of greatest importance for future industrial health planning. The cash indemnity insurance companies and the prepayment plans that reimburse private doctors and hospitals now do have most of the welfare

* The number of union members in California comprises about one-third of the total labor force of 3.5 million.

TABLE 1

Employee Benefit Plans in Union Agreements

Based on Analysis of 1,707 Collective Bargaining Contracts, California, February, 1950

Type of Plan	*Number of contracts*	*Employees covered*
Total agreements analyzed	1,707	Not available
Number with employee benefit plans [a]	191	179,900
Health Benefits	123	112,771
Vacation, health and welfare plans [b]	10	14,500
Group life insurance	97	84,100
Pensions	49	62,000
Disability Insurance only	5	7,329
Types of benefits not specified	13	5,200
Provision for establishing benefit plans in the future	16	19,300
Company sponsored plans in which union is given minimum voice [c]	12	28,800

[a] Contracts providing more than one type of benefit are counted separately in each group applicable. Therefore, the total number of contracts having employee benefit plans is smaller than the sum of the contracts granting each type of benefit.

[b] These are agreements of the International Ladies Garment Workers Union which generally provide for some type of health protection and often also for death benefits and vacation pay.

[c] Includes agreements which give the union some voice in but no control over the company plan, such as requiring the employer to notify the union before changing or abolishing the plan.

SOURCE: State of California, Department of Industrial Relations, Division of Labor Statistics and Research.

TABLE 2

Health Provisions in Employee Benefit Plans in Union Agreements

Based on Analysis of 1,707 Collective Bargaining Contracts, California, February, 1950

Type of Plan	*Plans*		*Workers Covered*	
	Number	*Percent*	*Number*	*Percent*
Total [a]	*123*	*100.0*	*112,771*	*100.0*
Cash benefit—commercial insurance carriers	91	74.0	83,466	74.0
Medical service plans (Non-profit)	22	17.9	28,217	25.0
Blue Cross—Blue Shield Plans	11	8.9	15,347	13.6
Group Practice Plans	11	8.9	12,870	11.4
Not specified	10	8.1	1,088	1.0

[a] Does not include all contracts in state. Since February, 1950, some 25 more health benefit plans have been established as part of union contracts.

SOURCE: State of California, Department of Industrial Relations, Division of Labor, Statistics and Research. Statistics analyzed by the Department of Public Health, Bureau of Adult Health.

fund contracts in California as in the rest of the United States. In our opinion, it is the newer trend toward union agreements with organized medical service centers that affords significance to the California experience. A few examples of current contracts can illustrate this trend.

Some 12,000 members of the International Longshoremen's and Warehousemen's Union scattered along the entire Pacific Coast are involved in a recent collective bargaining agreement for a health and welfare fund financed entirely by the employers. Despite the obvious difficulties of servicing members over a wide geographic area, it was decided that the wisest expenditure of money would involve contracts with group-practice centers where available, and with individual physicians and hospitals in other, smaller communities. An agreement with the Permanente Health Plan covers about 9,000 dock workers in the Los Angeles, San Francisco Bay, and Portland, Ore., areas, while similar arrangements exist with the Puget Sound Coöperative in Seattle, Wash. For the per capita premium of $2.70 per month, the longshoremen receive medical, hospital,

and related care, with a $1 charge per office visit and other small extra charges. A voluntary plan for family coverage is available to the union member. Both these service plans offer full-time medical groups based in the plan's own hospitals and medical centers.

The collective bargaining agreement of this union with the employers also includes the health and safety provisions previously described. The potentialities for coördinated health protection are here clearly in evidence.

A special arrangement with local unions in certain Bethlehem Steel plants in both Northern and Southern California illustrates an important new role for group clinics—that of supplementing the Blue Cross benefits of nation-wide collective bargaining agreements. In these areas, the Permanente Health Plan provides home, office, and hospital medical care to supplement the 70-day hospitalization contract that the steelworkers have negotiated nationally with Blue Cross. Interestingly enough, the group is reimbursed by Blue Cross when a steelworker is hospitalized in a Permanente facility.

The Retail Clerks Union in the Los Angeles area—representing some 10,000 workers—has negotiated a health fund of $8.60 per member per month to be paid by the employer. This fund will be used to furnish complete family medical care, based on group medical practice. To serve effectively the 20,000 or so persons who are now eligible for comprehensive medical care under this Retail Clerks' agreement, a new design will be developed for the Los Angeles area by the Permanente Plan. This will involve a network of community hospitals located in the various residential sections of the widespread metropolitan area, each with a full-time medical group and all related to a base specialty center. This is one of the large unions to contract for group medical care since the survey previously cited.

A recent arbitration decision affecting one culinary workers union in San Francisco actually specifies that the welfare fund of $5.60 per man per month must be used to purchase direct medical services rendered through group medical practice. This is the first instance in the state of such a specification under industrial arbitration.

The large medical group of over 100 physicians operating the Ross-Loos prepayment plan serves a sizable number of city employees and other groups (not organized under collective bargaining) in the Los Angeles area. The effective pattern evolved by this plan comprises a large central polyclinic staffed by medical specialists, with a peripheral network of small, general-practitioner health stations. Full medical care is provided for the worker and a reduced schedule of fees is established for dependents' care.

Another illustration of union arrangements for home, office, and hospital care furnished by a small private medical group is that of the Apartment and Hotel Employees Union in San Francisco. A contract with the Close group practice clinic at $4.50 per month provides a relatively wide scope of service to the worker. It is interesting to note that, since this group has no hospital facility, there is a cash benefit provision for hospitalization. Again, health funds secured through collective bargaining are used to finance the agreement. Family coverage is available on a voluntary basis, with premiums paid by the worker. Similar arrangements between small medical groups and local unions are in force in a few other California cities.

The union representing employees of the Key System Public Transit Company in the San Francisco East Bay area have organized their own direct service plan for $9 per month for a family of four. The plan employs four general practitioners on full- or part-time salaries

and provides specialty care, hospitalization, and drugs on a regular fee basis. Negotiations are now under way for employer contributions to the fund. Coördination between the general practioners and the industrial physicians employed by the company is so valuable that consideration is being given to the feasibility of combining the two functions under the union's Medical Plan.

The Southern Pacific Railroad Plan in San Francisco is one of the oldest industrial medical service plans in the country. Originally administered by the company, a few years ago the railroad employees' unions won participation and today the health service is operated by a joint employer-employee board, with a one-vote union majority. The plan, compulsory for all employees, provides full care to the worker through its own hospital facilities and full-time medical staff. Contracts with private practitioners provide care to employees in outlying railroad facilities. No arrangements have been made for care for dependents. The plan is basically financed by employee contributions ($4.25 per month), although the company contributes approximately half the cost of caring for industrial injuries. Similar medical programs are still operated by management in the Santa Fe and Western Pacific railroads. Unfortunately, little in the way of industrial hygiene is provided in these programs. The possibility of involving the large medical care staffs in occupational health work does, however, remain as a unique opportunity for "total" health care.

Conclusion

As labor and management become increasingly involved in health and welfare programs arranged through collective bargaining, new opportunities arise for progress in industrial health.

The first principle to be recognized is that preventive and therapeutic services are—or should be—inseparable, and that both can be furthered through the provisions of collective bargaining agreements. While preventive health and safety measures have occasionally been included, this aspect of health protection is usually subordinated to the provision of the more dramatic hospital care benefits. Nursing services, sanitation, case finding and other basic elements of good preventive medicine are rarely provided. Moreover, medical services for occupational illness and injury under compensation laws have not been coördinated with the newer arrangements for the care of non-occupational cases. Nevertheless, the potentialities for coördinated "total" health service are greater than ever.

A second consideration of importance to both unions and employers is that health and welfare funds can be spent wastefully or with only partial effectiveness when the principles of preventive medicine are forgotten. The recent experience of labor groups in California demonstrate that labor health funds can satisfy more of the basic elements of good medical care planning than is now true of most union plans. These include:

1. Non-profit financing
2. Service rather than cash benefits
3. Coördination of preventive and curative services
4. Comprehensive scope of medical care
5. Family coverage
6. Coördination of professional personnel in modern medical facilities
7. "Consumer" voice in policy making

Third, collective bargaining is itself a limited health weapon. A serious drawback is the inability of large industries covering wide geographic areas to provide all employees with adequate and uniform medical service benefits. It is hoped that both labor and management will recognize the need for a wide extension of group medical facilities, and for the development of such methods of financing as will make their comprehensive services available to all families.

Despite current advances, union members must not forget the larger issues.

Some fifty million workers plus their families are not now covered by health benefits in collective bargaining agreements. For those who are covered, unemployment or change of position means that job-connected benefits are suddenly abrogated. As vested interests in specific union plans develop, there tends to be less active interest in the broad social issues facing the general public.

Health can be further protected through coördinated provision for industrial hygiene and medical care in collective bargaining agreements. But the pitfalls are many and there are important parallel roads to the final goal of adequate health care for the whole population.

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New Division of Medicine and Public Health in Rockefeller Foundation

Chester I. Barnard, New York City, president of the Rockefeller Foundation, recently announced that on June 1 a new Division of Medicine and Public Health had been created in the Foundation by the merger of the former International Health and Medical Sciences Divisions.

The director of the new division is Andrew J. Warren, M.D., a member of the Foundation staff since 1921 and since 1945 associate director of the International Health Division. He succeeds George K. Strode, M.D., director of the division, who retired under the Foundation's age retirement rule as of May 31. Dr. Strode has been with the Foundation since 1916. He represented the division in receiving the Lasker Award for administrative achievement at the Annual Meeting of the American Public Health Association in 1950.

Also announced was the promotion of Alan Gregg, M.D., who for more than thirty years has been a staff member of the Foundation, to be vice-president. Dr. Gregg has directed the Division of Medical Sciences for many years. He is also chairman of the Atomic Energy Commission's Advisory Committee for Biology and Medicine.

Basic Data Needed in Planning Programs for the Care of Premature Infants*

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THE program for the prevention of premature birth and the care of premature infants is one of the few promoted by departments of health for which numerical data are readily available, not only for the measurement of needs and the planning of programs but also for the evaluation of results. No special reporting system is necessary, since existing laws require the registration of all births. The standard birth certificate recommended by the National Office of Vital Statistics for use during the decade 1949–1958 calls for the weight at birth and this item appeared on the certificates used in 1949 by all but one of the states.

The weighing of babies at birth is a well established practice even in home deliveries, and the entry of the weight on a birth certificate requires little effort on the part of the physician or the hospital records staff. The birth weight is a more accurate measure than period of gestation which is at best only a reasonable estimate. In the study of premature mortality in six teaching hospitals in upstate New York in 1945 and 1946 there were only occasional clerical errors in the recording of birth weight on the birth certificate.[1] It is a simple matter to tabulate, on the basis of weight, the number of premature births which occur each year in the various communities of the state. Facilities can be measured against need, and an adequate program for the care of premature infants planned accordingly.

In addition to the number of premature infants, one can also determine the fatality rate among them by matching certificates of infant deaths with the corresponding birth certificates. If this is done in the department of health of a state in which the registration of births and deaths is sufficiently complete, and the matching is limited to deaths under one month of age, one can obtain accurate rates in which the numerator of the ratio will contain all deaths occurring among the births represented by the denominator. The case fatality rates will be more accurate than those obtained from the records of hospitals to which infants may be admitted for care after delivery elsewhere or die shortly after being discharged. Few hospital record rooms are equipped even to segregate the records of their prematures for study. Personnel in these hospitals can hardly be expected to perform a detailed statistical analysis of the case fatality rates.

An individual state might set up its own definition of prematurity in terms of birth weight, tabulate the births by whatever weight groups it might think desirable, measure the mortality among the infants up to some specified age, and obtain statistics which would be entirely

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adequate to determine needs, plan facilities and services, and evaluate the program by relating facilities to case fatality. However, evaluation made in a manner peculiar to an individual state is of limited value. A state should be able to compare the effectiveness of its program with that of other states in which similar or different programs are in operation, and to compare fatality rates in particular hospitals having well organized facilities with similar hospitals in other states. The Children's Bureau, because of its long standing interest in reducing infant mortality and because of its more recent grants-in-aid to state programs, is particularly interested in comparing the effectiveness of these various programs. The National Office of Vital Statistics can make data available on the incidence of prematurity, but has no means of matching infant deaths to birth certificates in order to obtain fatality rates. Such data must originate in the states, and for it to be comparable from state to state, standard procedures for classification and tabulation should be formulated and adopted.

PLANS FOR STANDARDIZATION

Procedures of this nature have been proposed by the two organizations most directly concerned with statistics on prematurity and their uses in the states. These two organizations are the Association of Maternal and Child Health and Crippled Children's Directors and the Conference on Public Health Records and Statistics. Their recommendations are essentially as follows:

1. A premature infant should be defined for the purpose of statistical study as a live infant with a birth weight of 2,500 gm. (5½ pounds) or less.
2. Birth weight should be tabulated in at least the following groups: 1,000 gm. or less, 1,001–1,500 gm., 1,501–2,000 gm., 2,001–2,500 gm., and over 2,500 gm.
3. Certificates for all deaths under 1 month of age and the corresponding birth certificates should be matched and neonatal death rates calculated for premature infants in each of the weight groups suggested above.
4. The number of births with weight not stated should be shown separately, but weights for these births should be estimated on the basis of period of gestation.
5. For areas in which non-white births represent 5 per cent or more of the total, figures should be shown for white and non-white separately.

The Conference on Public Health Records and Statistics at its meeting in Washington in May, 1950, considered practical methods of obtaining mortality data for premature infants on a national scale. It suggested that a program for the collection of pretabulated data from the states be initiated as soon as possible for this purpose.*

Mortality data for premature infants compiled approximately in the manner recommended were available in 1948 for only three areas: New York City, New York State outside of New York City, and Connecticut. However, since practically all states included the item on weight at birth on the birth certificates used in 1949, data for many more areas should be available in the near future.

It was largely because discrepancies in their data made comparability difficult, if not impossible, that the Directors of the Bureaus of Maternal and Child Health of the New York City and the New York State Departments of Health decided to bring the matter of standardization of classification to the attention of the Association of Maternal and Child Health and Crippled Children's Directors.

The New York State Department of Health has been securing information on birth weight since 1940. This item appeared on the back of the birth certificate from 1940 through 1948. The change of this item to the face of the certificate in 1949 immediately improved reporting of birth weight from an aver-

* Since presentation of this paper the National Office of Vital Statistics has issued: Recommendations for Developing Comparable Statistics on Prematurely Born Infants and Neonatal Mortality, December, 1950.

age of about 91 per cent in the earlier period of 99.5 per cent in 1949. However, more complete reporting of birth weight makes the estimation of weight for the not stated group more important than ever in the calculation of mortality rates. In 1948, for example, the neonatal mortality rate for the group with "weight not stated" was 46 per 1,000; in 1949 it was 195 per 1,000. In the former year a large proportion of the "not stated" group came from certain hospitals where all the items on the back of the certificate were routinely ignored. A greater proportion of the 1949 group consisted of infants who were considered too small to weigh or who died immediately after birth.

Suggested Uses of Data

It is of interest to give a few illustrations of the birth certificate data which are being put to use in New York State. First of all, what is the observable trend in case fatality among premature infants? The mortality rate among premature infants has been declining since 1945, the reduction being 14 per cent in the five year period from 1945 through 1949. The declines in case fatality vary in the different birth weight groups. The improvement was greatest among the heavier premature infants with a birth weight from 2,000 to 2,500 gm., in which a 30 per cent decline was recorded, compared with 22 per cent in the next lower group, 13 per cent in the 1,000–1,500 gm. group, and practically no change among the smallest infants weighing 1,000 gm. or less. In the same five year period the mortality among full-term infants declined 27 per cent.

Analysis of fatality rates in individual hospitals for the same five year period also shows interesting patterns and variations. More than one-half of the births occurred in hospitals with an average of one thousand or more births a year. These are hospitals which can be expected to set up or improve special facilities manned by qualified personnel for the care of their own prematures, since they handle a sufficiently large number of cases to justify a full-time staff for the purpose. The premature infants born in these larger hospitals considered as a group had lower mortality rates than the hospitals with fewer births. Grouping all hospitals according to the average annual number of deliveries (1,000 and over, 500–999, 100–499, less than 100 births) one finds that the mortality rates varied inversely with the number of births, increasing as the size of the hospital decreased. The smallest degree of variation among hospitals of different size occurred in the mortality rates among very small infants and full-term infants.

The five upstate health regions are coterminous with the regions set up for hospital planning. Each region is centered around a medical school and one or more teaching hospitals, with the exception of the New York City suburban area. When the mortality rates were analyzed in each region, by size of hospital, the same pattern of inverse relationship between size and mortality was found for premature infants but not for those who were full-term. The variations in the rates between regions was very much less than among groups of hospitals by size, only one region, the New York City suburban area, having definitely lower rates in each weight group over 1,000 gm. It is debatable whether the low rates are the result of better facilities and care or of the higher social and economic status of the population. This matter will be investigated further.

Since the care of prematures has been improved in many hospitals in New York State in 1948 and 1949, it is desirable to have the most recent rates available to measure any effects of these changes. This is possible only in the hospitals having enough births to permit calculation of statistically significant

rates, namely: hospitals with more than 1,000 deliveries a year. Comparing the rates for the births in 1948–1949 in these hospitals as a group with similar rates for 1945–1947 it was found that the reduction in the mortality was considerably greater than in the upstate area as a whole. Furthermore it was learned that the reduction was greater in the six teaching hospitals than in the other large hospitals.

DATA FOR HOSPITALS

To promote improved care of premature infants the rates for individual hospitals are being published for the use of regional and local health officers as well as hospitals which may use them in comparing their experience with that of others.[2] The individual hospitals will not be identified except by code, each hospital being told the code under which it is entered. Only hospitals with an average of at least 500 births a year over the five year period are being shown separately. Smaller hospitals do not have enough premature births, even over a five year period, to produce rates that are statistically significant. The numbers of births, premature and full-term, are shown in each of the hospitals regardless of size but neonatal mortality rates are calculated for the smaller ones as a group in each region. Even in the larger hospitals the rates in each weight group may vary by chance over a wide range. We have shown the individual rates but computed a standardized total rate and total premature rate for each hospital, thus eliminating the variation in the total rates due to the variation in distribution of births by weight.

It would appear to be the responsibility of state departments of health to compute and make such data available. They are in a better position than local departments to correlate the information contained in birth and death certificates and insure uniformity of classification and tabulations. As indicated previously few hospitals, even the largest, have facilities for the statistical analysis of their cases.

The possible uses of statistics of prematurity obtained by correlating the information on birth and death certificates go far beyond program planning and evaluation. The birth certificates provide an unselected sample of cases by means of which basic research studies relating to premature infants can be made. In New York State, studies of the incidence of retrolental fibroplasia, the mortality rates of twins, and the relationship of prematurity to congenital malformations and birth injury are under way. It should be possible, also, to set up studies of the incidence of prematurity in different population groups in the hope of gaining some insight into its causes and means of prevention.

SUMMARY

1. With nearly nation-wide reporting of birth weights on birth certificates, the need for standard procedures for their classification and tabulation has become urgent.
2. The present advanced status of plans for securing standard procedures has been presented.
3. These data are useful in planning, promoting and evaluating programs for the prevention of premature birth and the care of premature infants, and for basic research studies in the field. It would appear to be the responsibility of state departments of health to compute and make such data available.

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Research in Nursing*

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IS one public health nurse needed for every 2,500 people? Should every local health agency be expected to make field experience available for students? In what ways can nurses function most effectively in meeting the legal responsibilities of the health department?

These and similar problems arise daily as the nursing profession seeks better ways to meet its responsibility to the patient and to the community. It is easy enough to raise such questions. Finding answers is a real feat, but is not impossible. Essentially this becomes a matter of research.

But what is research? An unnamed source has defined research as "dragging data out of an inaccessible place, tabulating them, and then filing them in an equally inaccessible place." Another has said, "research is not everything someone has thought about twice." The dictionary defines research as "diligent protracted investigation; studious inquiry. Specifically in science, a systematic investigation of some phenomenon or series of phenomena by the experimental method."

Pauline Young, in *Scientific Social Surveys and Research*, describes social research "as the systematic method of discovering new facts or verifying old facts, their sequences, interrelationships, causal explanations, and the natural laws which govern them. The primary goal of research—immediate or distant—is to understand social life and thereby gain a greater measure of control over social behavior."

Lent D. Upson states, "True research in the social fields is to collect facts about a specific problem, to measure them, to compare them with other facts or generally accepted truths, and to draw conclusions."

There are various modifications of these definitions, in accordance with the interpretation of the individual, but the essential qualities of investigation, experimentation, evaluation, and conclusion are common to all.

One is constantly confronted with problem solving in routine living. This involves recognition of a problem, consideration of the factors which will guide thinking on the problem, and then the conclusion reached. For example, one, particularly a woman, is faced daily with problems of what to wear. She will consider the weather, the people she expects to see, the places she will be, the activity she will perform, the time of her return home, and then will make her decision as to apparel in light of all these factors.

This same process is necessary for solving problems in any area. As it becomes more formalized it is referred to as the scientific method. Good, Barr, and Scates, in their book on research, outline six distinguishing features of the scientific method: "(1) its appeal to facts, (2) its application of the method of analysis, (3) its use of hypotheses, (4) its freedom from emotional bias, (5) its use of objective measurement,

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and (6) its use of quantitative methods in the treatment of data."

This procedure is used in both studies of service and research to find answers to problems. Service studies and research have many attributes in common. Basically the difference is largely a matter of scope, of intensity, and of size of the project. The service study has immediate and restricted application and involves use of data that apply only to a particular situation. It has, in common with research, a systematic planning of procedure and a careful checking of results at each step. The service study or survey may serve its purpose when it removes the difficulty encountered or it may serve as a segment of a research project. Research, on the other hand, undertakes the definition of basic general principles that can be applied universally. It usually involves a large number of cases and long time intervals.

Research is thought of most often in connection with the physical sciences. It is equally useful in the social sciences although the complexity of society has been somewhat of a deterrent in its use. The ways to approach any complex problem are: (1) to break it down into its simplest components and to examine each part, (2) to develop techniques for handling an increasing number of variables. A beginning has been made on each of these approaches.

Physical science, too, was complex at a stage of development comparable to the present status of knowledge of fundamental principles of social science. Through the years, increasingly accurate measuring instruments and recording devices have been developed for use in the physical sciences, which have made it possible for workers to achieve a degree of objectivity in reporting their work and have enabled other workers to verify the findings so reported. At one time, heat and cold could be reported only as subjective sensations—now they can be reported in terms of a scale on a thermometer so that anyone who can read a thermometer can verify the reading of another. Such concepts are developed as a result of extensive reliable records kept over a long period of time.

In the physical sciences it is much easier to set up true experimental conditions in which the situation is under the control of the investigator. In social sciences the investigator is sometimes hampered by the fact that he is dealing with human society and the human being, either singly or in groups, is unpredictable and hard to control. In addition, because he himself is a member of the group, he may be influenced in his observations. Despite the necessity for establishing some sort of controls in any research situation, it is admittedly difficult to set up such controls in most social studies. Futhermore, individuals or groups under study conditions may not behave in the same manner as a similar individual or group not under observation. Precise laboratory methods cannot be carried out in social research and the wide range of variables makes delimitation of a study difficult. There is no well charted path for the researcher in social sciences.

A certain amount of glamor is connected with the word research by some people. Disillusionment often comes to the beginning investigator when he finds that glamor is a very small part of the job, that most of it is sheer monotony and hard labor, that discoveries of scientific laws are few and far between, and result only from lengthy and exhaustive work and discipline. The endless taking of measurements, the recording of repeated observations, the interviewing of many people, the editing and coding of numerous schedules, the limitless calculations for tables, form the bulk of the work on any research investigation.

The research investigator needs to have curiosity, imagination, persistency, and a healthy skepticism about the obvious. He must be willing to follow

blind leads and be alert to subconscious flashes which may bridge the gap from the "hunch" to real result. Above all, he needs intellectual integrity because that is basic for all research.

Objectivity is usually listed as the prime requisite for anyone who is going to do research. Volumes have been written about the subject. Is it possible to be entirely objective? All knowledge comes to the individual through his senses so that what is perceived differs from person to person. One is influenced by his physiological condition, by his physical environment, by his training and experience, by the mores of his culture. The neuromuscular alignment that determines what shall be perceived and how it shall be interpreted is referred to as "bias."

Bias is a word that sometimes has been in disrepute because of the connotation of prejudice. In the scientific sense it simply means the particular slant of the individual. Each individual has his own characteristic bias, which differs from person to person. If one is realistic in attempting to achieve objectivity he is aware of his own bias and then chooses his area of investigation and his method of procedure in view of this bias.

One needs to be alert for bias in agencies and groups as well as in himself. Too often research is sponsored because the agency expects to prove that what it is doing is good or desirable rather than to learn the facts. Vested interests have influenced research findings and have even caused their suppression, depending upon whether the findings were to their advantage or disadvantage. Many organizations and professions whose purposes are lofty and commendable will not face facts which present a real or implied threat to their prestige or program.

Before undertaking any research project one needs to consider certain factors. Is basic information in usable form available or can it be obtained? To what extent is the satisfactory completion of the study dependent upon factors outside the control of the investigator? The more this is so, the more precarious is the undertaking. Is there sufficient time to do the study? What will it cost? What arrangements for personnel, including clerical help, need be made? Are supplies and equipment adequate for tabulation and analysis? Will the report be made available to those who can utilize its findings?

Methods to be used in carrying on research vary considerably and the one selected in any particular instance will depend upon the problem. The historical, the case, the experimental, the investigative method—each has its place in research. Any study of the development of public health nursing in this country would utilize the historical method. Clinical medicine depends, to a great degree, upon the case method, because conclusions must often be arrived at from limited material. The experimental method is much easier of application in the physical sciences than in the social, since man is a bit difficult to keep in a controlled situation and the factor of the control, in and of itself, has to be reckoned with in interpretation of findings. Some techniques have been developed whereby the experimental method, in a limited form, can be used in the social sciences. The investigative method is the one that is used most frequently and the one that seems to yield the most promising results, at our present stage of development of techniques for studying society.

When any research project is being considered, one of the first steps is to determine its purpose. This can be done most easily by asking a series of questions. These questions should serve to define the objective, delimit the problem, and guide the plan for the conduct of the investigation. The problem should be defined in specific terms. The plan for the study would cover the kinds of

data needed, the sources, and the methods to be used in getting them. Next comes a review of existing material on the subject. Maybe the problem has been answered already, maybe certain parts of the investigation have been done so that one can proceed from there. The formulation and testing of hypotheses or assumptions on the subject serve to limit the area of investigation and offer a means of determining the relationship among facts. The collection of material is followed by its classification, analysis, and finally by interpretation, recommendations, and prediction.

The preparation of a time table setting a deadline for the completion of each step of the project is invaluable. The time allowed for analysis and interpretation of the data should be at least as much as for their collection. In planning, the time necessary for writing the report is often overlooked.

The investigation should be carefully documented, and the procedure used outlined so that another worker could repeat the experiment under conditions similar to those originally employed. It is recognized that the findings of any experiment, in either physical or social science, are as of a given time and place and under given conditions. In records of repeated observations, under conditions as similar as possible, begins to appear a common thread. Eventually this forms the basis for the formulation of a scientific theory or law which is "true" at the stage of knowledge of man at that time. The real scientist is constantly on the alert for negative findings for even the single observation that does not conform, although it may invalidate all of his work to that point. Such is the price of progress in scientific discovery.

The nursing profession has been aware of the value of research as a way of problem solving for a long time. Probably no other professional group has been studied, analyzed, and evaluated more. Up to now, most of these studies have been done by persons whose primary interest and training are in research. Many problems in any field can be solved more expeditiously by such a person than by a worker in the area under investigation. Other problems can be studied best by a person in the particular profession. Too few groups have individuals skilled both in the particular profession and the field of research.

Nurses, by virtue of their preparation, are skilled observers so they have one of the essential attributes for research. The make-up of the individual determines whether he can do research because, as in other things, a certain point of view, a certain state of mind is basic.

Another way to do research is through the team concept where representatives of two or more fields each contribute the skills of his discipline to the solution of mutual problems. This necessitates a healthy respect on the part of each participant for the resources, the skills, and the know-how of the others. It also involves an appreciation, by every worker, of the importance and the value of each part of the investigation, no matter how apparently trivial or insignificant it seems.

The upsurge in interest in doing research exhibited by nurses themselves is encouraging. Qualified professional nurses are earnestly seeking the means of answering the many problems that are pressing for investigation and solution. It is gratifying that projects are beginning to appear with greater frequency from nurse investigators. In our zeal to meet this one of the criteria of a profession, we need to be alert that what we report as research or even as studies can stand up under the scrutiny of social scientists.

Before undertaking a study, arm yourself with some of the excellent treatises on research. For an understanding of the principles involved and the step by

step procedure, *Scientific Social Surveys and Research* by Pauline V. Young, and *The Methodology of Educational Research* by Good, Barr, and Scates, are helpful. Puffer, *Practical Statistics in Health and Medical Work,* and Garrett, *Statistics in Psychology and Education,* provide information necessary for the mathematical and statistical treatment of data.

As "must" reading before beginning each investigation, and for re-reading whenever the going is difficult, I would suggest a pamphlet by Lent D. Upson entitled *About Heuristics. A Letter from a Dean of Public Administration to His Graduates.* Reading it will help one to gain a proper perspective about research faster and more painlessly than anything I know.

SUMMARY

Research is the collection of facts about a specific problem, their measurement, their comparison with other facts and generally accepted truths, and the arrival at conclusions which must be in harmony with the stated objectives.

Service studies and research projects have in common a systematic planning of procedure and careful checking of results at each step. The service study has immediate and restricted application while the research project seeks the definition of basic principles that can be applied universally.

Research in the social sciences presents certain problems because of the complexity of society and because of man's lack of precise instruments of measurement and recording of social data.

Bias of both the investigator and of social groups must be considered in any study. A brief mention has been made of some of the methods of doing research and of some of the techniques found useful.

The nursing profession is beginning to assume some responsibility for doing its own research. The individual investigators should consider very critically what is labeled as research, to be sure it can stand the test of evaluation by the scientific method.

Industry has made major contributions to research. I can do no better than to conclude by quoting a statement made by the Gulf Oil Company, which puts quite succinctly what I have been attempting to say about research.

1. It is a state of mind that is discontented with things as they are.
2. It is a pair of eyes that yearn to see through the curtain of obscurity to fact.
3. It is a hand wielding a knife to cut a thing down to its smallest particle—and then to cut open the particle.
4. It is a brain for which there is no peace without knowledge and understanding—and no end to either.
5. It is a soul more concerned with mankind than with self—more anxious for progress than for triumph.
6. It is a man—indomitable and uncompromising.

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THE COMPLEX PROBLEMS OF MEDICAL CARE

IT is interesting and encouraging that The American Academy of Political and Social Science has devoted a recent issue of its ANNALS [1] to the subject of "Medical Care for Americans." The objectives to be attained in the provision of medical care are health and medical problems; but the methods by which these objectives are to be attained involve social and economic problems, which cannot be solved by doctors and health officers without the counsel of experts in the field of the social sciences. We therefore welcome the interest of the Academy in this vital area of our national life.

The volume includes brief and succinct reviews by the most competent American authorities of such subjects as research and professional education in the service of health, local health organization, hospitals and health centers, group practice, medical care for the needy, voluntary and compulsory insurance, dental service, rehabilitation, relationship to the armed services, to organized labor, to industry and to minority groups, the quality of medical care and the principles of planning for a broad health program.

It is heartening to know that we have so many serious students of this pressing problem. Twenty-nine authors have coöperated in preparing the papers presented in this volume—all of them scholars and experts, not propagandists. This issue of THE ANNALS will be of great value to us all today and to future scholars, on a competent cross-sectional picture of the status of medical care in the United States in mid-century.

In the AMERICAN JOURNAL OF PUBLIC HEALTH, we have been fortunate in being able to present to our readers in the last few months a significant series of papers on various systems of providing medical care and on distributing effectively the cost of such care. The authors have represented the most diverse viewpoints, ranging from placid contentment with Blue Cross and Blue Shield plans as adequate to solve the entire problem, to conviction that only a national compulsory insurance program can meet our needs. We welcome a full presentation of all these positions which are all of them needed if we are to reach wise and considered judgments.

The economic and social problems involved in the financing of any program of medical care are complex and highly specialized. Comparatively few members

of this Association (or of any other association) are competent to evaluate the financial complexities of various prepayment plans, their social impact and their probable effectiveness. The authors of the papers in THE ANNALS have such competence; and so have the members of our A.P.H.A. Subcommittee on Medical Care (which is represented by five of the authors in THE ANNALS volume).

In consideration of the actual value of the services provided to the human beneficiaries of any prepayment program, the public health worker has a major contribution to make. As the accredited representative of the public interest in all health matters, he may properly formulate certain criteria by which the probable results of any proposed program may be judged; and at least two such criteria are clear and obvious.

The first yardstick which must characterize a satisfactory plan for providing medical care is the extent to which such a plan includes prevention as well as cure. We happen, in our business, to accept the ancient adage that "a stitch in time saves nine." We really believe in the loosely used term "preventive medicine." We know that the care of catastrophic hospitalized illness is "preventive," in the sense that it often prevents death or serious crippling; but we also know that many of the catastrophic hospital illnesses could themselves have been prevented by medical attention at an earlier stage of the disease process. One criterion of any system of financing medical care is the extent to which that system facilitates and encourages resort to the physician at the time when the very first signs of "dis-ease" occur.

Our second yardstick is the one which has so well been emphasized by the subcommittee of the C.A.P. in its report on "The Quality of Medical Care in a National Health Program." The quality of medical care is not something to be measured by the yard or by the hour. It is not necessarily assured by contact between a single physician and an individual patient. It may involve complex technical services and may require the collaboration of various qualified medical specialists. The public health administrator has the right—and the duty—to ask whether the machinery of any proposed plan of prepayment is such as to facilitate and favor the highest standards of quality attainable in a given community.

Dr. George Baehr in the February issue, and Dr. E. R. Weinerman in the present issue of this JOURNAL, have described programs which go far to meet the essential public health criteria suggested above. The H.I.P. program in New York City and the Permanente Hospital and Ross-Loos programs in California are excellent examples of prepayment plans which facilitate the practice of basically preventive medicine and which provide group-practice service of far better than average quality. We may properly ask—in regard to any existing, or proposed, program for financing medical care—how far is the system calculated to favor the ideals of preventive and high quality service. If such ideals are not reasonably attained, what we purchase may not be worth the price.

1. *Annals of the American Academy of Political and Social Science* 273:1 (Jan.), 1951. 3817 Spruce Street, Philadelphia, Pa.

STATISTICS OF PREMATURITY

MISS Parkhurst and Dr. Schlesinger in the present issue of the JOURNAL point out the great importance of improving and standardizing procedures for recording and tabulation of data in regard to prematurity, particularly with regard

to period of gestation and—so far as possible—with respect to weight at birth. Such data are greatly needed for program planning and as an aid to research on this problem; and it is a primary responsibility of the state health department to see that they are made available.

The Children's Bureau and the Public Health Service are urging the adoption by each state of the new definitions of live birth and fetal death recommended by the Third World Health Assembly.[1] The American Public Health Association passed a resolution at its last Annual Meeting in St. Louis recommending the adoption of the new International definitions. Similar action was taken by the Association of the State and Territorial Health Officers and by the American Committee on Maternal Welfare. There appears to be general support for the immediate adoption of these definitions and for discarding the old term "stillbirth" for the new term "fetal death." However, it is also recognized that the changes recommended in regard to the registration of *all* dead fetuses will take many years to accomplish.

The present statistics on fetal deaths in the United States are extremely limited due to a number of reasons. For example, "stillbirths" as now defined in the state laws and regulations usually include fetuses of gestation age over 20 weeks. The exclusion of early fetal deaths (under 20 weeks) makes the present statistics on fetal deaths a very poor index of pregnancy wastage. If estimates were to be made for the United States from data for New York City which include all products of conception, there would be about 500,000 fetal deaths annually, whereas only 75,000–80,000 stillbirths are registered each year according to the old definitions. In addition to the limited gestational-age coverage, stillbirths are defined differently in the different states, and there is considerable variation in the completeness of registration of stillbirths.

The adoption of the new definition of fetal death will extend the information needed for medical and social study of the problem of pregnancy wastage. It will also focus attention on a long neglected health problem of considerable magnitude.

Although there may be some question as to the preventability of all fetal deaths, a fuller knowledge of the problem cannot fail to prove of substantial value. Great progress has been made in the prevention of infant mortality which was a major public health problem not more than 30 years ago. Fetal mortality is probably a problem of greater magnitude than infant mortality ever was. If we had the facts, it might be possible to look back 30 years hence to see notable progress in the prevention of fetal deaths.

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1. *International Recommendations on Definitions of Live Births and Fetal Death.* Federal Security Agency, U.S.P.H.S. National Office of Vital Statistics, (Oct.), 1950.

NOISE PROBLEMS IN THE HOME AND IN THE FACTORY

IT is well recognized that sound waves of undue intensity may exert important and injurious effects on human health. If the sound level be above 120–130 decibels, temporary pathological damage to—or destruction of—the hearing mechanism may result. At levels above 60–70 decibels, an unfavorable influence may be recorded by measurable physiological alterations in respiration rate and blood pressure, and derangement of digestive functions. Between 60 and 30 decibels (the

latter being about the level of a quiet outdoor environment) there may be psychological effects, nervous reactions, inhibition, annoyance, and fatigue. (It should be remembered that a small change in decibel value involves a great change in physical intensity of noise; a level of 60 decibels has one thousand times the intensity of a level of 30 decibels and one of 90 decibels has a thousand times the intensity of one of 60 decibels.)

In the home, pathological effects do not occur, but physiological and psychological handicaps to normal living are often present. This problem has been admirably analyzed by Prof. R. H. Bolt of M.I.T. in the most recent report of the Committee on the Hygiene of Housing.[1] He points out that our reactions to sound stimuli are relative and not absolute. Music from a piano in an average room or from a powerful radio set may exceed a sound level of 80 decibels or more. If that is what we want at the moment, the psychological effect is good, just as in some moods a glare of light or the booming of a thunderstorm may be pleasantly stimulating. What we need is to hear what is pleasant to hear and not to hear what causes discomfort or distraction or alarm. The gleeful screams of children in a reverberant dining room may be hard on the digestion of adults. Noise which interferes with normal conversation is vexatious. As Dr. Shirley W. Wynne [2] has said "when we hear a loud noise—especially one that is intermittent like the screeching of automobile brakes now and again throughout the day—our heart action becomes irregular, our blood pressure increases, our muscles tense for action, our movements become more energetic. In brief, we are undergoing the fear reaction —we are keyed up to fight whatever new danger these signs may betoken . . . we can discipline ourselves to a certain extent and we do. But the fact remains that our unconscious reaction to noise continues in spite of our conscious indifference to it." Certain sounds have unpleasant connotations (such as the flushing of a noisy toilet). An admirable study by the Building Research Station in England [3] showed that one person in two is bothered by outside noises (traffic or children's play). In flats of old type construction one person in three is troubled by his neighbor's noise; while the ratio rises to one in two for more recent frame construction. Most significantly, the subjects (representing 2,000 families) seemed to suffer more from inhibition in their own activities through fear of disturbing the neighbor than they suffered from the neighbor's noise!

The most serious problem in urban American homes is, of course, that caused by automobile traffic. Bolt recommends for housing sites that the sound level in the street should be less than 40–60 decibels for half the time, and less than 50–70 decibels for 90 per cent of the time. Yaffe of the U. S. Public Health Service [4] has recently discussed the relative importance of legislation and education in moderating the noise nuisance in our cities.

So far as interior noise sources in dwellings are concerned, Bolt provides us with detailed and helpful data on noise isolation standards for construction, on sound absorbing finishes and furnishings, on sound absorption treatment and on the control of noise from household equipment; and shows that, with proper planning and design, desirable results can be attained at reasonable cost.

In a business office, the problem is somewhat different. Here, we are often dealing with higher sound levels than those generally encountered in the home; but their continuity mitigates some of the psychological effects of intermittent and unexpected sounds. Both physiological and psychological effects are, however, present and are of substantial importance. Laird,[5] studying four typists, working at maximum speed, found that the excess of their metabolic rate over that at rest

was diminished by 50–70 per cent as a result of a 7 decibel drop in noise level. Sabine[6] cites experience of the Aetna Life Insurance Company where careful records were kept in three departments before and after installation of sound absorbent treatment, which reduced the sound level by 8 decibels (decreasing noise intensity by about one-half). The measured increase of efficiency was about 9 per cent and the decrease in number of errors was 25 per cent.

In many factories, of course, the noise problem is much more serious,[6] involving pathological damage as well as temporary physiological effects. At a distance of three feet, an average lathe produces a noise level of 80 decibels, automatic riveters, looms and wood planers of over 90 decibels, while punch presses, drop hammers, and wood planers may exceed 100 decibels. Sabine cites data showing that in certain employments exposed to high noise intensity, half of the workers have definitely impaired hearing. The west coast states and Texas (where shipbuilding presents serious problems), Connecticut, New York, North Carolina, Minnesota, and Wisconsin have all had compensation claims allowed for impairment of hearing.[6]

Less obvious, but no less serious, is the nervous fatigue involved, which according to one observer contributed to more than four-fifths of some 2,500 accidents studied. Where absorbent treatment cannot materially reduce the noise hazard, attention should be given to mitigating its effect by suitable ear defenders[6] and to provision of special rest periods.

The problem is one which deserves more attention than it has received from the public health engineer and the industrial hygienist.

1. Committee on the Hygiene of Housing, A.P.H.A. *Standards for Healthful Housing.* Vol. III *Construction and Equipment of the Home*, 1951, p. 33.
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6. Sabine, P. E. The Problem of Industrial Noise. *A.J.P.H.* 34:265, (Mar.), 1944.

LETTER TO THE EDITOR

To the Editor:

I read with interest the editorial "The Annual School Health Examination—An Archaic Anomaly" on page 448 of the April, 1951, issue of the *American Journal of Public Health.*

For the sake of accuracy and historical record, I suggest that the first sentence in paragraph 2 which reads, "The Astoria Plan was introduced by the New York City Department of Health in 1940," be corrected to read, "The Astoria Plan was introduced jointly by the New York City Department of Health and by the Board of Education of the City of New York in 1940."

The same holds true for the opening statement in Dr. Alfred Yankauer's article on page 383 of the same issue which reads, "The Astoria Plan of elementary school medical service was adopted by the City of New York Department of Health in 1940." In view of the fact that I was intimately associated with the Astoria Plan during its formative period and throughout the entire experiment, I believe I know how the Astoria Plan was introduced, and under whose auspices it was started.

I. H. GOLDBERGER, M.D.,
Director of Health Education, Board of Education, New York, N. Y.

April 25, 1951

Credit Lines

ENRICHED RICE CONTROLS BERIBERI

In the publication, *Better Health through Better Rice,* the Williams-Waterman Fund Research Corporation (405 Lexington Avenue, New York 17) summarizes experience with respect to control of beriberi in the Philippines through vitamin B_1 enrichment of rice.

In 1948, after many years of study, Dr. Robert Williams, chemist, who was the first to synthesize vitamin B_1, went to the Philippines to experiment with a plan to control beriberi. The isolated peninsula of Bataan, a rice-growing province which consumes most of its own rice, was divided into two areas in one of which all rice was enriched and the other used as a control area. A nutritional survey was made of the entire experimental zone and of approximately 22 per cent of the population in two of the control municipalities. In July, 1947, about 13 per cent of the persons examined in the two areas were found to have beriberi.

Two years later in the enriched area a resurvey included 11,000 persons in the earlier survey. Of these 90 per cent were better and many were without any symptoms. In the first full year of enrichment beriberi deaths decreased by two-thirds in the enriched zone, while increasing slightly in the control area. In the three months, April-June, 1950, not a single death from this cause was reported in the enriched area.

Word of this successful experiment, Dr. Williams reports, has spread throughout the Far East and has started many governments to plan for enrichment in their areas. In the Philippines the work is shortly to be extended to another province.

The cost of the experimental program has been about 35 cents per capita annually. It was carried out with the joint assistance of the Williams-Waterman Fund for the Combat of Dietary Diseases, of which Dr. Williams is chairman, the Philippine Department of Health, the Philippine National Rice and Corn Corporation, the Philippine Institute of Nutrition, the U. S. Public Health Service, and Hoffman-La Roche Inc., vitamin manufacturers.

Better Health through Better Rice is worth reading not only for its scientific story but for its implications for the peace of the world.

WELCOME CONSOLIDATION IN GEORGIA

Atlanta, Ga., has a population of over 325,000. Although situated largely in Fulton County, about 11 per cent of Atlanta's citizens are in Dekalb County. Plans for consolidating certain services have been made to take effect in January, 1952.

Fulton County will assume responsibility for all public health activities in the entire county of nearly 500,000 persons and will take over some 225 present city health employees. That section of Atlanta which is in Dekalb County will be served by the Dekalb County Health Department, the cost to be met by an appropriation from the city.

On the other hand, Atlanta will assume police, fire personnel, and public works responsibilities for all of Fulton County. The General Assembly has directed the respective personnel boards of the city and county to survey their respective merit systems and personnel policies to develop a uniform personnel plan and merit system.

In view of the fact that Georgia's 159 counties are a greater number than in any other state except Texas, and that there are fewer persons per county than

in any except sparsely settled states, this is an interesting development that may well have a profound effect on Georgia's social history. Before the Atlanta-Fulton County consolidation, it already had 25 multiple county health departments serving a total of 66 counties.

COMMUNITY SELF INVENTORY

The Bureau of Health Education of the California State Department of Health has prepared *Inventory of Local Health Problems, Resources and Services*. It is designed as a tool through which citizens may answer for themselves such questions as, How much health protection do we have? What do we need? This is a much less detailed survey schedule than the *Evaluation Schedule* of the American Public Health Association but is designed as such to give citizens an intelligent interest in their health services.

SOCIAL HYGIENE VISUAL AIDS

The Wisconsin State Health Department has prepared a listing, with brief descriptions, of social hygiene visual aids. Two dozen sound films, two recordings, and 7 film strips are described, covering the broad subjects of physiology of sex, courtship and marriage, and venereal disease.

HEALTH ON TELEVISION IN ILLINOIS

The weekly televised health talks arranged by the Educational Committee of the Illinois State Medical Society are already in their third year. In 1950 they won an Oscar from the TV audience in the forum and discussion classifications of Chicago productions.

The American Medical Association has now made available the list of programs beginning with the first one on Oct. 1, 1948, and going through April 9, 1951. Tips for program participants are included. A number of programs like "The Common Cold," "The Second Child Arrives," "Guardians of Your Sleep," have been used more than once. This material is on file in the National Health Library, 1790 Broadway, New York.

REPORTING MEDICAL PROGRESS

Recently *Medicine in the News* was reported on (*A.J.P.H.* 41, 3:342 (Mar.) 1951). Now the Schering Corporation (Bloomfield, N. J.) has begun another publication. *Medicine in Progress* reports the latest clinical observations and developments in experimental medicine. The first issue, appearing about March, 1951, summarizes the new advances in hormone therapy. It is apparently being sent to physicians without charge.

DIABETES TEACHING AIDS

A new kit of educational materials on diabetes has been prepared by the Diabetes Branch of the U. S. Public Health Service with the coöperation of the American Diabetes Association and the American Dietetic Association. The kit, with the general title of *Taking Care of Diabetes* is intended for both patients and professional workers. The materials have been approved by the American Nurses Association.

The kit is intended for individual and group instruction of diabetic patients and their families. It includes:

- 11 Film strips in color with accompanying narration on 16 inch records, 33 1/3 r.p.m., covering such teaching points as "What is Diabetes," "Insulin and Its Use," "Meal Planning," "Tests in Diabetes," and "Care of the Feet," and with patient "take home" booklets covering the key teaching points
- 12 Wall charts in color picturing salient facts about diabetic care
- 1 Instructor's Guide describing effective teaching methods
- 1 Diabetes diagnosis and treatment Guide Book published by the American Diabetes Association, Inc.
- 1 "Meal Planning and Exchange Lists" with diet inserts

The kit is being distributed by Health Publications Institute, Raleigh, N. C.,

from whom information as to purchase should be secured. The entire kit sells for $49.80 but items are also available separately.

EVERYBODY'S BUSINESS

Clean Water Is Everybody's Business, published by the U. S. Public Health Service, presents a simple story of a complex problem. Prepared in coöperation with state water pollution control agencies, the report relates problems of and objectives in stream pollution control and portrays ways in which the objectives can be attained. Pictures, maps, charts, and photographs tell most of the message. It is suitable for use with citizen groups. Supt. of Documents, Washington, D. C., 20¢.

FLY CONTROL PROGRAMS

Two recently published packets are particularly timely for those health departments initiating comprehensive fly control programs.

The first, *Fly Control Program Materials,* prepared by the Illinois State Department of Public Health, puts in the hands of a health department or a citizen's committee a ready-made schedule of activities and supporting material. Suggestions for the organization of a civic committee tell the how, what, and when of a good program. Examples of posters and other educational material are given and a comprehensive bibliography of films is included. A series of news releases, aimed for consecutive publication, can be fitted to any community by the inclusion of appropriate locality names, dates, etc.

The second, *Fly Control Packet,* was prepared by the Communicable Disease Center, U.S.P.H.S., in Atlanta, Ga. Basically similar to the Illinois material, it is more extensive and includes more technical information on control measures. It has a more complete bibliography, is longer, and includes many references to printed publications.

Write to the Illinois Health Department, Springfield, or the Communicable Disease Center, Atlanta, Ga., respectively, for the particular collection in which you are interested.

SPREADING THE NEWS

A recent folder of fact sheets by Spokesmen for Children illustrates how one agency is helping to make a great many persons conscious of the meaning of some of the legislation now before Congress. Spokesmen for Children is a voluntary agency whose main purpose is to watch—and influence—legislation affecting children.

As such, its recent fact sheets were brief summaries of bills in Congress affecting children directly or indirectly. The matters on which Spokesmen pleads for affirmative action are, the Local Public Health Units Bills, Emergency Aid for Medical Education, Federal Aid to Education, Child Research, and adequate appropriations for maternal and child health, child welfare, and crippled children's services. The series, called "The Shadow of Tomorrow on the Children of Today" is a good illustration of effective appeals for action in a few simple paragraphs. Spokesmen for Children, 654 Madison Avenue, New York 21.

RABIES EDUCATION AIDS

The Health Publications Institute (Raleigh, N. C.) has prepared 6 new posters on rabies with the coöperation of the Veterinary Public Health Services of the U. S. Public Health Service. Each is in four colors, 14″ x 22″ on heavy poster stock. Titles are:

Rabies Can Strike Any Time
Mad Dog! Protect Yourself
Protect Your Dog From Rabies
The Fox Can Transmit Rabies
Rabies Kills Livestock
Impound Stray Dogs For Rabies Control

They are 25c each, $10 per 100, $75 per 1,000.

SUMMER STUDIES IN SOCIAL HYGIENE

The April issue of *Social Hygiene News* (1790 Broadway, New York 19) publishes a list of summer courses and workshops in family relations, social hygiene, and health education from Daytona Beach, Fla., to Forest Grove, Ore.

WORTH ACQUIRING

Discipline and Emotional Health is the report of the second workshop on emotional health held at the Cleveland Health Museum in March, 1950. The conference was sponsored jointly by the Pupil Welfare Committee of the Cleveland Teachers' Union and the School Advisory Committee of the Museum and attended by over 1,000 persons. The report is particularly valuable for teachers but not without its usefulness for parents. 8911 Euclid Ave., Cleveland 6, 25¢.

The Child With Cerebral Palsy has been prepared by the U. S. Children's Bureau in coöperation with the U. S. Office of Education. It tries to answer some of the questions about cerebral palsy that the ordinary citizen might want to know. He will learn with relief that it is not hereditary, is not catching, and its effects can be lessened through special training and education. Govt. Ptg. Office, Washington, D. C., 10¢

A new *Pierre the Pelican Series on Marriage and Family Life* was released by the Louisiana Society for Mental Health for Mental Hygiene Week, May 2–8. It is designed for distribution to high school seniors and is planned to reach all seniors within a given school system. The society has set up priorities with regard to the use of the materials.

The nine titles are:

Milestones to Marriage
Personality and *You*
Your Present Home and Your Future Home
Preludes to Courtship
Love—or "Love"
It's Better To Match Than To Patch
When Are You Ready for Marriage?
Partners in Living
To Sum It All Up

Information as to plans for use, priorities, and price from the Society, 816 Hibernia Building, New Orleans 12.

R.I.P. (which in this instance is translated to read Rest In Pieces) is the 1951 automobile accident booklet of the Travelers Insurance Companies (Hartford, Conn.). "A very funny book about a very unfunny subject," it announces itself to be. Each set of statistics is humanized with a cartoon by VIP, the magazine cartoonist. It is distributed free with permission for unlimited reprinting or other use. It should be useful as a part of a safety education kit.

Each Member and Fellow of the A.P.H.A. is urged to fill in and return promptly the Membership Directory information card that was sent with the recent Association Newsletter.

BOOKS AND REPORTS

All reviews are prepared on invitation. Unsolicited reviews cannot be accepted.

Pneumoconiosis–Beryllium Bauxite Fumes–Compensation—*Leroy U. Gardner Memorial Volume, edited by Arthur J. Vorwald. New York: Hoeber,* 1950. 646 pp. Price, $7.50.

In the fall of 1941, two women came under observation at the tuberculosis sanitarium in Middleton, Mass., both suffering from disabling dyspnea. Physical signs were essentially negative. A short time later, a young engineer arrived at the sanitarium with the same complaint and the same clinical picture. These three persons had been employed in a factory building where fluorescent lamps were manufactured. Now it is clear that these three persons were victims of beryllium inhalation and its effects on the lungs.

Much important knowledge of beryllium and its effects began to accumulate after the occurrence of these two cases and in 1946 Dr. L. U. Gardner, then Director of the Saranac Laboratory, began to make plans for a beryllium symposium. This conference was held in the fall of 1947. Unfortunately, there has been much delay in printing the report of the conference. It finally emerged from the press late in 1950.

A series of 29 contributions present what was known about beryllium from the industrial aspects, the acute disease, the chronic disease, studies of toxicity of beryllium in connection with atomic energy production and, finally, the atomic aspects of beryllium poisoning. The large number of papers presented in this volume may give the reader the impression that the role of beryllium was clear and unequivocal. That such is not the case may be seen from two somewhat conflicting statements. In his paper on Pathologic Aspects Vorwald says, "In the light of present knowledge some etiologic significance may be attached to beryllium, but definite proof that beryllium is the causal agent is still lacking." Contrast this with the conclusion of Martland in his paper on Post Mortem Observations, "On the basis of a study of the foregoing cases, of the Van Ordstrand report on acute beryllium poisoning, of the Hardy and Tabershaw report on chronic beryllium poisoning, and of the work of the late Dr. Gardner, who conducted experimental investigations by injecting beryllium compounds into animals, I have reached the opinion that the existence of industrial beryllium poisoning is well established."

Nevertheless, bearing in mind the short time which beryllium poisoning has been under study, it is clear that much progress has been made. Machle put the problem in acurate perspective at the symposium when he said "With due regard to the combined efforts of all concerned, it should be stated that we are attempting to get in a few years time knowledge of a disease that normally would be accumulated only after decades of study. Silicosis has been known for years, yet knowledge of the mode of action of the various forms of silica and the treatment are today still far from clear."

Another rather new pulmonary disease entity, Shaver's disease, was presented to the conference in three papers. This disease, it has been definitely established, is produced by the inhalation of the furnace fume from the electric smelting furnace used to convert bauxite ore in the manufacture of corundum.

It is to be regretted that a critical summary of the whole volume is not presented so that the interested reader, not an expert in the field, might come away with a simple statement of what was known about the effects of beryllium inhalation. The volume is to be regarded as the most important source of information on the effects of beryllium inhalation in the American literature.

LEONARD GREENBURG

Militant Angel—*By Harriet Berger Koch. New York: Macmillan,* 1951. 167 pp. Price, $3.00.

Anyone attempting to portray Annie W. Goodrich through the medium of a biography faces an almost insurmountable task, and to try to do it successfully in 167 pages seems, to this reviewer, hopelessly optimistic. Mrs. Koch has faithfully and interestingly recorded events, dates, and honors as the milestones in her life of shining achievement; but where is Annie W. Goodrich, the real person? How did these events mold and direct her thinking and action? How did her philosophy of nursing education grow from these experiences? Mrs. Koch shows Miss Goodrich's influence on the institutions with which she was connected and, convincingly, the changes of policy and aim wrought by her farsighted leadership, but one seeks in vain for the unfolding of the spirit, the maturing of wisdom and skill in human relationships which are a part of every great biography, and an inseparable part of Miss Goodrich.

Those of us who have known Miss Goodrich for three decades and have had the rare privilege of working under her statesman-like guidance (never really "militant," however, an unfortunate adjective to apply to a lover of peace) will be disappointed in this biography. Even the amusing episodes, delightful retorts, and diplomatic solutions to problems so characteristic of her do not quite bring Miss Goodrich before us. One chapter could well have been devoted to Miss Goodrich, the public speaker. We do not get a sense of the amazing range of subjects which she handled with scholarly thoroughness and incisive English in 40 years of platform appearances; we see only the list.

Miss Goodrich, the teacher, is missing. Mrs. Koch does not describe the never-to-be forgotten experience of sitting in her classes and trying to keep up with the lightning logic of her class discussions—an experience from which one nurse emerged saying, breathlessly, "That woman's brain never stops straining at its leash! I'm exhausted!"

The "Yale era," Part V of the book, is by far the best writing. Here, and in the last chapter, Miss Goodrich becomes a warm human being with failings like the rest of us mortals. In all the preceding chapters she is a paragon of energy, wisdom, and driving purpose, but not an "angel"—not even a militant angel, surely not, and I do not believe Miss Goodrich thinks so either!

But in spite of its shortcomings, every nurse should read this book. We have needed the record for a long time. Besides, it serves as a curtain-raiser on that future, long, complete and interpretive biography that will some day give our greatest nurse-thinker to the world.

DOROTHY DEMING

Sanitary Milk and Ice Cream Legislation in the United States—*By A. C. Dahlberg and H. S. Adams. Washington, D.C.: National Research Council, National Academy of Sciences,* 1950. 59 pp.

This report deals with the first phase of a study of regulations in relation to quality in force in 1949 in the 48 states and also cities of 100,000 or more population. It contains a compilation of specific requirements and explanatory summaries, also information as to agencies having enforcement jurisdiction.

The information and data presented

are of interest and value to the industry, official control agencies, consumers and the general public welfare.

The committee is continuing its assignment and will later issue a report of the second phase of the study, i.e., "the effect of sanitary milk and ice cream statutes and regulations, as measured by their administration and enforcement as well as by actual experimental procedures, on the quality of milk."

WILLIAM B. PALMER

Twentieth Anniversary Review. *New York: Josiah Macy, Jr., Foundation,* 1950. 110 pp.

In these days of many foundations and a stream of annual reports, those who wish to be well informed will be grateful for the summary which presents in very readable form the purposes and program of this Foundation established in 1930 to assist scientific investigations of the fundamental aspects of health, of sickness, and of the methods for the relief of suffering. Dr. Willard R. Rappleye, President, points out that this frame of reference expresses the need for the multi-professional approach to health problems and for the integration of medicine with the biological and social sciences.

The Foundation has had interest in the problems of aging, in psychosomatic medicine, in special problems growing out of the war years, in medical education and medical practice, and in what is called a conference program. It is pointed out that in every period of scientific development certain areas of research are in fashion, while others are unpopular either because of difficulties in making progress, or because of prejudice in the current climate of opinion. Foundations have a responsibility to seek these neglected but significant areas of research.

A unique development has been an attempt under the Foundation's auspices to re-integrate science, which is now artificially fragmented by the isolation of the several scientific disciplines into the specialties. Facilities have been provided for investigators in the various branches of medicine to meet with members of their own disciplines and with representatives of other related disciplines for informal discussion. As a nucleus, 15 scientists comprise the original group of members for any conference and from time to time new members are added to fill gaps in viewpoint or technic. Attendance at any meeting, including guests, is limited to 25. The group meets for 2 days at least once a year and over a period of from 3 to 5 years. Thirteen conference groups were holding regular meetings under the auspices of the Foundation during 1950 and, in addition, some 76 special conferences have been held to discuss other problems. Included within these regular conference topics are those of blood clotting and allied problems, problems of infancy and childhood, problems of the aging, factors regulating blood pressure, problems of the adrenal cortex and problems of consciousness.

The Josiah Macy, Jr., Foundation is to be congratulated on developing a highly useful and unusual type of foundation activity and an excellent summary. REGINALD M. ATWATER

Your Body—*By John Tebbel. New York: Harper,* 1951. 233 pp. Price, $2.95.

This book is written by a professional science writer. As Dr. Morris Fishbein remarks in the introduction: "I can say that practically everything in the book represents the best medical opinion of this particular time."

Mr. Tebbel has done more than express facts. He has expressed them in a simple, clear-cut style which is very appealing and readable. The book is not concerned with medical treatment, but with hygienic practice. In this respect it offers to the reader sensible

discussions of such topics as how to reduce body weight, what to do about indigestion, television, sunburn, exercise and fatigue, baldness, dental decay, tobacco, alcohol, posture, colds, healthy sex life, psychosomatic illness, health for old people, and a variety of other significant health problems.

The appeal of this book lies in its simplicity and its authenticity. Mr. Tebbel has done an excellent job of presenting to the public in non-technical terms the basic hygienic facts for the prevention and alleviation of many health problems. The book contains a brief but good index and a short annotated bibliography in the form of notes on sources used in preparation of the volume. OLIVER ERASMUS BYRD

Social Work Year Book 1951—*By Margaret B. Hodges, Editor (11th ed.). New York: American Association of Social Workers,* 1951. 696 pp. Price, $5.00.

This description of organized activities in social work and in related fields is an essential reference book for anyone engaged actively in public health. With the increased recognition, among persons engaged on boards and staffs of community agencies, of the interrelationships of the part of our social structure, and with the increased emphasis on understanding, mutual interests and teamwork, this "storehouse of information," is timely.

The 73 topical articles cover subjects from administration of social agencies to youthful offenders, with public health discussed by the Surgeon General, besides such important subjects as alcoholism, chronic illness, the crippled, housing, maternal and child health, and school health services, for example. Activities and agencies are regarded as related, according to the preface, if their practitioners share with social workers the responsibility for service to a common group of clients (as illustrated by an article on Public Health Nursing), or if their problems and objectives sharply impinge upon the area of social work practice and interest (labor standards, for example).

Fortunately, this rather technical sounding definition of objectives fails to "cramp the style" of authors who present lively descriptions of what is happening nationally and on a world-wide basis with respect to the business of dealing with people, in families and communities, on a constructive basis, and with more indications of joint planning and coöperative action than disclosed in one volume previously. Also the selective bibliographies are valuable for many purposes. IRA HISCOCK

Problems of Social Policy (History of the Second World War)—*By Richard M. Titmuss. London: H. M. Stationery Office; New York, British Information Service,* 1950. 596 pp. Price, $5.75.

This study by Richard Titmuss, a well known British social scientist, is one of a series of volumes covering the civil (social and economic) history of World War II in Great Britain. The series was undertaken as a result of a decision of the War Cabinet in 1942, when a group of social scientists, economists, historians, and sociologists was given access to official documents in order to study the policy and experience of the British government during the war.

The author has chosen to deal chiefly with three selected topics—the evacuation of mothers and children, the work of the hospital services, and the social consequences of air attack. Based on official records as well as reports and documents provided by local authorities and voluntary agencies, Mr. Titmuss has done an exceedingly competent job, which is also full of human interest. He shows how government policy originated and developed, and then traces the course of events through the war. At

all times the author is cognizant of the societal framework, and the changes forced upon society by war conditions.

In the last analysis this is a book dealing with the brutal impact of war upon human lives, and the social costs that were paid as a result receive due attention. Broken homes, neglect of educational needs, delinquency of young people—all of these are considered in the balance sheet drawn up at the end of the study.

This is an impressive account of the experience of a civilian population under conditions of modern warfare. It is must reading for all public health workers, both as professional persons and as citizens. GEORGE ROSEN

Practical Food Inspection—*By C. R. A. Martin (4th ed.). London: H. K. Lewis & Co., Ltd.*, 1950. Volume I—Meat Inspection, 322 pp. Volume II—Fish, Poultry, and other Foods, 308 pp. Price 18*s* net for each volume.

These two volumes in their third edition were reviewed in the *American Journal of Public Health* in September, 1948, p. 1287. The same comments, criticisms and revisions can be given this fourth edition. The additions have been very minor. Practically no changes have been made in Volume I—*Meat Inspection*. Only six pages have been added to the fourth edition.

Some material has been added to Volume II—*Fish, Poultry and other Foods*, particularly to the chapter on food poisoning. Stress is still being placed on the Salmonella type of food poisoning, perhaps because of the more frequent occurrence of this type in England. There is an increase of twenty-four pages in the fourth edition of this volume.

Again it should be pointed out that while these two volumes do not contain a single reference verifying the statements made by Mr. Martin, and many of the statements presumably are the opinion of the author, these books are of value to the lay inspector as a source of general knowledge. The reader must keep in mind, however, that English customary procedures and in some instances English laws have materially influenced the author.

The fourth edition of these two volumes is bound attractively and the printing is readable, as is the third edition. If the third edition has been purchased and read, the fourth will not contribute very much to the reader's store of knowledge. FERDINAND KORFF

Federal Food, Drug and Cosmetic Law: Administrative Reports, 1907–1949—*Introduction by Paul B. Dunbar. Chicago: Commerce Clearing House*, 1951. 1446 pp. Price, $22.50.

The present Food and Drug Administration of the Federal Security Agency is charged primarily with the responsibility of enforcing the Federal Food, Drug and Cosmetic Law of 1938. Earlier the law was the Food and Drug Law of 1906, and the name of the agency itself has undergone changes. Throughout its existence, however, from the days of Harvey W. Wiley and the old Bureau of Chemistry, down to Paul B. Dunbar, present Commissioner of Food and Drugs, this agency has quietly and efficiently helped to safeguard the health of consumers by the judicious enforcement of the federal food and drug laws.

Each year since 1907 this agency has published an annual report in which there is summarized the important activities of the year. Interested persons may obtain each current report as it is printed, usually in January each year, by writing directly to the Administration and requesting a copy. The older reports have long been out of print and are not readily available.

The publishers of the present volume, therefore, have rendered a service by republishing the entire series of annual reports, with the exception of the most

recent publication for the year 1950. Together with an excellent historical introduction, and an index, these reports constitute the present imposing volume. It represents the first in a series of books to be known as the "Food Law Institute Series" and which will be compilations and studies of the laws pertaining to foods.

FRANKLIN C. BING

Here's to Sobriety—*By Thomas Fullam. New York: Abelard Press,* 1950. 208 pp. Price, $2.50.

Again a personal experience of the learned problem-drinker, a discovery of the way of total abstinence by a disciple and sincere believer in Alcoholics Anonymous. Also an excellent fourteenth chapter on what "AA" does not and what it does offer to the compulsive drinker who has hit bottom whether at "low" or at "high." The final "Nutshell" chapter where the anonymous author offers nineteen paraphrasings as substitutes for the terse and classical twelve of the original "AA."

For the rest, the book follows the common line of pseudo-scientific chatter; the ordinary slang and wisecracks that imply acceptance without substance of the ascertained facts.

The myth of personal "allergy" to explain why the compulsive drinker adheres to his pattern of life or succumbs to the lure of the bottle, is heavily stressed to justify the multifarious dilemmas of the problem drinker. This is a tempting short cut for the lay reader who likes to use the terms of medical biology as if he understood them.

There is no recognition or admission of the fact so well established by Pollack, Jellinek, and others that at least 60 per cent of the problem drinkers acquire habits of excess by the easy way of social example and not because of any prior biological or inherited quality of body or personality.

Proofreading seems to have been hurried. There is no index.

The author keeps closely to his commitment. "I am not crusading against liquor, nor propagandizing for it. I am strictly in a neutral corner concerned only for the fellow who is going down for the count."

HAVEN EMERSON

Your Blood Pressure and Your Arteries—*By Alexander L. Crosby. New York: Public Affairs Committee,* 1951. 31 pp. Price, 20 cents.

This review of a very common problem has been produced in coöperation with the American Heart Association and, as Howard B. Sprague, M.D., President of the A.H.A., points out in the introduction, the age bracket of leadership for our defense effort roughly corresponds to the ages when high blood pressure develops. The booklet tells what precautions are necessary and gives advice to the 20 per cent of the adult population who already have increased tension or hardening of the arteries.

The pamphlet concludes, "It would be reassuring to say that the full resources of government and private institutions have been recruited to solve problems that for millions of citizens mean the difference between a useful life and a wasted one. But it isn't so. Until a very few years ago the amount of money spent on research in diseases of the heart and circulatory system was hardly enough to cover the advertising budget of a five-cent candy bar."

The pamphlet can be recommended by public health workers.

REGINALD M. ATWATER

BOOKS RECEIVED

Listing in this column acknowledges the receipt of books and our appreciation to the senders. Space and the interests of readers will permit review of some, but not all, of the books listed.

ACCEPTED DENTAL REMEDIES (16th ed.). Chicago: American Dental Assn., 1951. 222 pp. Price, $1.50.

ADMINISTRATIVE MEDICINE. Edited by Haven Emerson. New York: Thomas Nelson, 1951. 1007 pp. Price, $10.00.

ALLERGY: FACTS AND FANCIES. Samuel M. Feinberg. New York: Harper, 1951. 173 pp. Price, $2.50.

CHILDREN IN THE FAMILY: RIVALS AND FRIENDS. Edith G. Neisser. New York: Teachers College, Columbia Univ., 1951. 60 pp. Price, $.60.

CHRONIC ILLNESS. Digests of Selected References. Public Health Service Publication No. 10. Washington: Govt. Ptg. Office, 1951. 216 pp. Price, $.50.

DEFENSE PROGRAMS OF SELECTED FEDERAL AGENCIES AFFECTING COLLEGES AND UNIVERSITIES. Atlanta, Ga.: Board of Control for Southern Regional Education, 1951. 56 pp. Price, $.40.

DEVELOPING DEMOCRATIC HUMAN RELATIONS THROUGH HEALTH EDUCATION, PHYSICAL EDUCATION AND RECREATION. Washington: American Assn. for Health Physical Education and Recreation, 1951. 562 pp. Price, $4.25.

DIABETES MELLITUS. Garfield G. Duncan. Philadelphia: Saunders, 1951. 289 pp. Price, $5.75.

EDUCATION FOR RESPONSIBLE PARENTHOOD. Research Interpretation Service, Alabama Polytechnic Institute and Health Publications Institute, Inc. Raleigh, N. C.: Health Publications Institute, Inc., 1950. 80 pp. Price, $.75.

EXECUTIVE BOARD. Seventh Session Held in Geneva from January 22 to February 5, 1951. Part II. Comments and Recommendations on the Proposed Programme and Budget Estimates for 1952 and Review of the Organizational Structure and Administrative Efficiency of the World Health Organization. Geneva: World Health Organization, 1951. 134 pp. Price, $.75.

EXPERIMENT IN THE CONTROL OF TUBERCULOSIS AMONG NEGROES. Jean Downes. New York: Milbank Memorial Fund, 1950. 67 pp. Free.

ENTEROBACTERIACEAE. F. Kauffmann. Copenhagen: Ejnar Munksgaard, 1951. 338 pp. Price, $7.50.

FELTCRAFT. New York: Fun With Felt Corporation, 1951. 31 pp. Price, $.50.

GROWTH, REPLACEMENT, AND TYPES OF HAIR. J. B. Hamilton, A. E. Light, et al. New York: Annals of the New York Academy of Sciences, 1951. 290 pp. Price, $4.00.

HEATING VENTILATING AIR CONDITIONING GUIDE 1951. Vol. 29. New York: American Society of Heating and Ventilating Engineers, 1951. 1456 pp. Price, $7.50.

HISTORY OF NURSING. Gladys Sellew and C. J. Nuesse (2nd ed.). St. Louis: Mosby, 1951. 439 pp. Price, $3.75.

IMMUNOLOGY. Noble Pierce Sherwood (3rd ed.). St. Louis: Mosby, 1951. 731 pp. Price, $8.00.

INDUSTRIAL HEALTH AND MEDICAL PROGRAMS. Margaret C. Klem, Margaret F. McKiever, and Walter J. Lear. Washington: Govt. Ptg. Office, 1950. 397 pp. Price, $1.00.

INTRODUCTION TO A PSYCHOANALYTIC PSYCHIATRY. Paul Schilder. New York: International Universities Press, 1951. 178 pp. Price, $3.25.

INVENTORIES OF APPARATUS AND MATERIALS FOR TEACHING SCIENCE. Vol. I Primary, Secondary, and Vocational Schools. Paris: UNESCO, 1950. 92 pp. Price, $1.00.

LARGE QUANTITY RECIPES. Margaret E. Terrell (2nd ed.). Philadelphia: Lippincott, 1951. 414 pp. Price, $7.00.

LEPROSY. E. Grunberg, et al. New York: Annals of the New York Academy of Sciences, 1951. 142 pp. Price, $2.75.

MANUAL FOR WATER WORKS OPERATORS. Texas Water Works and Sewerage Short School. (3rd ed.). Austin, Tex: Texas Water and Sewage Works Association, 501 West 33rd Street. 1951. 573 pp. Price, $4.50.

NEUROSES—DIAGNOSIS AND MANAGEMENT OF FUNCTIONAL DISORDERS AND MINOR PSYCHOSES. Walter C. Alvarez. Philadelphia: Saunders, 1951. 667 pp. Price, $10.00.

NUTRITION AND ALCOHOLISM. Roger J. Williams. Norman, Okla.: Univ. of Oklahoma Press, 1951. 82 pp. Price, $2.00.

OUR ATOMIC HERITAGE. Arnold B. Grobman. Gainesville, Fla.: Univ. of Florida Press, 1951. 147 pp. Price, $2.95.

PERSONNEL ADMINISTRATION IN PUBLIC HEALTH NURSING. William Brody. St. Louis: Mosby, 1951. 209 pp. Price, $3.25.

PROPOSED PROGRAMME AND BUDGET ESTIMATES FOR THE FINANCIAL YEAR JANUARY-DECEMBER, 1952. With the Proposed Programme and Budget Estimates for Technical Assistance for Economic Development of Under-

Developed Countries. Geneva: World Health Organization, 1951. 571 pp. Price, $3.00.

PUBLIC WELFARE DIRECTORY 1951. Loula Dunn, Editor. Chicago: American Public Welfare Assn., 1951. 365 pp. Price, $5.00.

QUININE FOR QUINIDINE FORMULARY. Theodore Koppanyi (rev. ed.). New York: Cinchona Products Institute, 1951. 36 pp.

RICE, DIETARY CONTROLS AND BLOOD PRESSURE WITH MENUS AND RECIPES. Frances I. Seymour. New York: Associated Booksellers, 1951. 206 pp. Price, $2.95.

SPEECH HABILITATION IN CEREBRAL PALSY. Marion T. Cass. New York: Columbia Univ. Press, 1951. 212 pp. Price, $3.00.

STUDY OF LIVING CONDITIONS IN SUBSTANDARD ONE AND TWO-FAMILY HOUSES IN NEW YORK CITY. New York: Committee on Housing, Community Service Society, 1951. 98 pp.

TUBERCULOSIS AMONG CHILDREN AND ADULTS. J. Arthur Myers (3rd ed.). Springfield, Ill.: Charles C Thomas, 1951. 894 pp. Price, $12.50.

TUBERCULOSIS—YEAR 1950. Tuberculosis Hospital Facilities in New York City Changing Forms of Treatment in Pulmonary Tuberculosis. A Report to the Tuberculosis Sanatorium Conference of Metropolitan New York by Godias J. Drolet. New York: New York Tuberculosis and Health Assn., 1951. 12 pp.

WATCH OUT FOR THE WEATHER. Jacqueline Berke and Vivian Wilson. New York: Viking Press, 1951. 226 pp. Price, $2.95.

YELLOW FEVER. George K. Strode. New York: McGraw-Hill, 1951. 710 pp. Price, $9.50.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

New Term: "Claimant Agency"—Do you know all about it? You'd better read this short report anyway—a report which the writer says might be called, "The Children's Bureau looks around at what is happening and peers ahead into the fog."

BAIN, K. The Children's Bureau Looks Ahead. *Pediatrics* 7, 4:602 (Apr.), 1951.

Human Nature Being What It Is—Here is a conclusion with far-reaching implications: ". . . persons holding jobs will not attend cancer detection clinics or visit . . . physicians. A pilot program demonstrated that industrial workers will submit to cancer detecting examinations if made on the premises."

BERG, B. N. A Pilot Program for Cancer Detection in Industry. *Arch. Ind. Hyg. & Occup. Med.* 3, 3:279 (Mar.), 1951.

Mixed Opinions—An ex-GI said: "This is the same stuff we had in the Army—but *good*." A teacher said: "This information should be a part of our teacher training program." A strip-teaser from a girlie show on the fair grounds said: "It's indecent! It oughta be thrown off the midway!" They were all talking about Michigan's V. D. tent show.

COWAN, J. A. A New Approach to Venereal Disease Education at Michigan Fairs. *J. Ven. Dis. Inform.* 32, 4:91 (Apr.), 1951.

Definitive Is Really the Word—Not likely will another item on the particular subject appear in this perennial listing of the names of other people's brain-children. Here is the *last* quote: "Penicillin alone far surpasses any previously used antisyphilitic remedy when appraised from the therapeutic, economic, technical, toxicity rate, or therapeutic aspects."

CURTIS, A. C., *et al.* Penicillin Treatment of Syphilis. *J.A.M.A.* 145, 16:1223 (Apr. 21), 1951.

For All To Ponder—You wouldn't expect a comprehensive dissertation on the application of psychologic concepts to public health practice and the inter-

personal relationships in it, all to be squeezed into 5 pages. And you do not find it here. But what you will get, if you read the paper, is a disturbing realization of need—for all of us—of what the writer suggests is good for nurses.

FARNSWORTH, D. L. The Nurse's Role in Mental Health. *Pub. Health Nursing* 43, 4:173 (Apr.), 1951.

If Diphtheria Menaces Adolescents—About 2 of every 5 high school students who had not been immunized against diphtheria within the previous 5 years had low serum antitoxin titers. Booster doses raised the antitoxin levels satisfactorily, and they are recommended when high school youngsters need protection. Preferred toxoids and dosages are given here.

GEORGE, J., *et al.* Diphtheria Immunization Studies of Students in an Urban High School. *Am. J. Hyg.* 53, 2:178 (Mar.), 1951.

Testimonial—This girl concocts her own proverbs as she goes along: "He who has felt the service of the hand is better able to accept the service of the mouth." It is a good trick if you get away with it—as she does here.

HAMBLETON, V. The Staff Nurse Likes a Combination Program. *Pub. Health Nursing* 43, 4:186 (Apr.), 1951.

Mark Up Another Victory—Five years of experience with water fluoridation in one Canadian community reveals gratifying improvement. Among 5-year-olds the percentage of caries reduction is 54. This ranges downward to 11 per cent among the 11-year-olds whose teeth were well on their way before the water treatment began.

HUTTON, W. L. The Brantford Fluorine Experiment. *Canad. J. Pub. Health* 42, 3:81 (Mar.), 1951.

Fair Warning—Here is an epidemiologic appraisal of the *Health Services and Special Weapons Defense* manual's assertion that "an enemy could employ . . . biological warfare against us effectively." All of which leads this expert to conclude that the manual is right and that we ought to get busy with defense measures.

LANGMUIR, A. D. The Potentialities of Biological Warfare Against Man. *Pub. Health Rep.* 66, 13:387 (Mar. 30), 1951.

Statesmanship in Sanitation—Environmental health services will be improved chiefly by three factors, says this authority: (1) boldness with which we redefine and reëstablish services to meet modern needs; (2) competence with which we broaden programs to the same end; (3) leadership we take in developing the teamwork essential to effective administration.

HOLLIS, M. D. Environmental Health: A Critique. *Pub. Health Rep.* 66, 13:400 (Mar. 30), 1951.

"Walkie-Squawkies" and other Devices—Not because of its store of immediately practical information is this paper commended to you. (It is good for you occasionally to read something clearly of no quick profit to you.) Your attention is called to it because of a novelty in it. There are a lot of interesting looking pictures with no legends: you have to read the text to find out what the illustrations are about! Clever, isn't it? By the way, have you ever heard of health physics?

MORGAN, K. Z. Historical Sketch of Radiation Protection Experience and Increasing Scope of Radiation Protection Problems. *Ind. Med. & Surg.* 20, 4:148 (Apr.), 1951.

Next Step after Screening—In complete detail the methods employed to set up a diagnostic center in connection with the administration of a city-county chest survey are described. How they got things done, and who pitched in to help out are matters that should interest you.

REISNER, D., AND RIKLI, A. Community-Wide Chest X-Ray Survey. *Pub. Health Rep.* 66, 14:423 (Apr. 6), 1951.

Good Shop Talk—This is the sort of thing we should have a lot more of. A physician and three school nurses talk about what they are actually doing—under a variety of situations—about school health. "In my school," or the equivalent, occurs time and again throughout the talks. Consequently the papers are down-to-earth, realistic *and* exceedingly readable.

SELLERY, C. M., *et al.* The Nurse in the School Health Program. *J. School Health* 21, 4:119 (Apr.), 1951.

Can a Thing So Good Be So Wrong?—One cannot minimize the value of finding 30 to 50 hitherto undetected cases of chronic disease in each 1,000 "multiphasically" screened persons, admits the writer, but such a screening unit established as a primary public health function is unsound in concept, untenable in principle, and indefensible in logic, he says.

SMILLIE, W. G. "Multiphasic" Screening Tests. *J.A.M.A.* 145, 16:1254 (Apr. 21), 1951.

Mostly About Chores vs. Understanding—From Durban, South Africa, via England, comes the warning that health education, too, is at the cross roads. "(It) must move in harmony with these new ideas or face a lengthy period of monotonus trundling along well-worn and erosive pathways." The new ideas referred to are too involved to be epitomized here, but they are challenging.

STEUART, G. W. The Future of Health Education. *Health Ed. J.* 9, 2:66 (Apr.), 1951.

Motion Picture Film Reviews

HOMER N. CALVER, *Film Review Editor*

At Our House. Multiple screening. Available in 16 mm. and 35 mm. Black and white. Sound. 8 minutes. Produced for the Vermont State Department of Health by the Communication Materials Center of Columbia University Press, 413 West 117th Street, New York 27, N. Y. Can be purchased or rented from the Center. Purchase price $30 for 16 mm. print; $65 for 35 mm. print. Rental charge for 16 mm. is $2.50 per day or $5 per week; for 35 mm. the rental fee is $6 per day or $12 per week.

This picture tells the story, in a homey fashion, of a family of four persons, representing three generations, who are invited to have a health screening test. Examinations of the eyes, ears, blood pressure, chest, and mouth are shown, together with the taking of a sample of blood.

The outcome is well presented, with two persons showing negative findings and the other two referred to the family physician, one for refraction and the other for further examination that turns out to be early recognition of diabetes.

The picture is simply done, but well calculated to inform and attract the general public. From the standpoint of medical technique, it is accurate, and the story is well adjusted for public understanding. The film can be recommended for showing to the general public as preparation for a multiphasic screening program. REGINALD M. ATWATER

Feelings of Depression. Mental health and personality development. 16 mm. Black and white. With sound. 30 minutes. Produced by National Film Board of Canada. Distributed in the United States by McGraw-Hill Book Co., Text-Film Dept., 330 West 42nd St., New York 18. For purchase, about $105; for rental, consult local film libraries.

This fourth film in the Canadian series on mental mechanisms was, like the others in the series, presumably prepared

for use in teaching psychiatry to medical and postgraduate students. Unlike some of the others of the series, the trailer specifying this has been omitted from this film so that it appears to be presented, with no explanation, to the general public. It would have been better to have added the trailer and let the public have the thrill of seeing a restricted film.

Psychiatrically, the film displays a severe depression of psychotic dimensions. The illness is alleged to have arisen out of long standing hostile feelings toward a father who valued regularity and dependability so highly that these virtues are sought by his son, the patient, in such a way that his creativity is repressed. This conflict eventually culminates in the depressive illness. The only assumption allowed by the film is that the psychodynamics it displays are causative in the illness. To many psychiatrists to whom the answer to the etiological problem does not appear so simple and uncomplicated, the film will not only appear superficial but definitely misleading. It sets forth as proven, things which at best are still in the realm of hypotheses, and when shown to the public which is not equipped to judge such issues, such cocksure presentations in effect approach deception.

The sound track on the reviewer's copy was unclear and frequently very difficult to understand. Theatrically, the film is satisfactory and has the advantage of a fairly realistic setting in a middle class home. Characterizations are consistent, perhaps more consistent than one can find in real life, but convincingly played.

The film has some value for psychiatrically trained audiences, since it will undoubtedly provoke discussion, but it is not suitable for showing to the public.

PAUL V. LEMKAU
MARCIA M. COOPER
BENJAMIN PASAMANICK

Rodney. Tuberculosis case finding and control in young adults. 16 mm. Color. Sound. 10 minutes. Produced by the National Tuberculosis Association, 1790 Broadway, New York 19. Obtainable through local tuberculosis associations.

"Rodney," a sprightly color cartoon, tells the story of a jaunty young man who is found to have early tuberculosis, enters a sanatorium, and returns to his friendly community and the girl of his dreams.

In telling Rodney's story, the film manages to present:

1. A simple explanation of the disease
2. The value of tuberculosis case finding by periodic medical examination including chest x-ray
3. The fact that tuberculosis also affects moderate income groups and young people
4. The good response of early tuberculosis to treatment
5. The need for complete bed rest in treatment
6. The importance of the examination of intimate contacts

While the film gains much from its brevity, the presentation of the method of transmission of the disease is overbrief. The film may leave the impression that infection with tuberculosis arises almost inevitably from casual associations with the general public.

This film should find its best use among people of high school and college age. However, the film's stress on the use of the chest x-ray as a method of case finding among young adults may be questioned, since tuberculin testing among high school and college students is also an adequate form of tuberculosis case finding.

The principal message of the film is restated in the closing minutes by Rodney's friend, who states that Rodney was not just lucky in having his tuberculosis discovered early and cured, but had been smart enough to have an annual physical examination, including a chest x-ray.

THOMAS F. PUGH
RALPH T. FISHER

RECENT MOTION PICTURE RELEASES

(All 16 mm. black and white, with sound, unless indicated otherwise.)

Eight Infants. Tension Manifestations in Response to Perceptual Stimulation. A record of the behavior of 8 infants before, during, and after stimulation of the types usually given small infants in ordinary family life—such as being shown toys, being played with vigorously by relatives, etc. Of interest to people professionally concerned with child development and to students engaged in behavior observation. 3 reels. 16 mm. Silent. Produced by Menninger Foundation Department of Research, and distributed by the Department of Communications, New York University Film Library, 26 Washington Place, New York 3, N. Y. Purchase price for the 3 reels $100; rental $5 a day.

Some Observations Concerning the Phenomenology of Oral Behavior in Small Infants. Two reels that document variations in oral behavior in a number of infants under 24 weeks of age. Intended for professionals interested in developmental psychology and also as a teaching aid for students engaged in behavior observations. 16 mm. Silent. Produced by Menninger Foundation Department of Research, and distributed by the Department of Communications, New York University Film Library, 26 Washington Place, New York 3, N. Y. Purchase price for the 2 reels $75; rental $3.50 a day.

Going Steady? Problems of teen-age dating. Intended for high school and also adult audiences. Available in color as well as b. & w. Sound. 10 minutes. Produced by Coronet Films, 65 E. South Water Street, Chicago 1, Ill. Purchase price $45 for b. & w.; $90 for color. Consult film rental libraries for rental costs.

Laboratory Diagnosis of Rabies. Shows step-by-step procedures in diagnosing rabies. This film is a detailed version of a brief sequence in another film, **Striking Back Against Rabies.** Runs 5 minutes. Produced and distributed by Communicable Disease Center of Public Health Service, 50 Seventh Street, Atlanta, Ga. For free loan address Medical Director in charge.

You Can Lick TB. Shows occupational rehabilitation programs conducted in Veterans Administration hospitals. 21 minutes. Produced and distributed for free loan by Veterans Administration. Address requests to Presentation Division, V.A., Washington, D. C.

Angry Boy. Modern psychiatry in action. A presentation for professional and lay groups interested in child development. 16 mm. Black and white. Sound. 33 minutes. Produced for the Mental Health Film Board of Michigan and distributed by International Film Bureau, Inc., 6 North Michigan Avenue, Chicago 2, Ill., for purchase, $105. For loan consult local mental health organizations; for rental consult film rental libraries.

Friend in Blue. The work of the public health nurse. In color. Runs 30 minutes. Produced by Audio-Visual Education Dept., University of Minnesota, from whom it can be purchased at $250. Not for loan or rental outside of Minnesota.

ASSOCIATION NEWS

SEVENTY-NINTH ANNUAL MEETING
AMERICAN PUBLIC HEALTH ASSOCIATION
SAN FRANCISCO, CALIF., OCTOBER 29–NOVEMBER 2, 1951

FELLOWSHIP IN THE AMERICAN PUBLIC HEALTH ASSOCIATION

The grade of Fellowship was established in the American Public Health Association in 1922. Professional workers in public health are eligible for election as Fellows under certain conditions and as an indication that they have achieved a recognized professional standing. As of January 1, 1951, the total membership of the Association was 12,253, including 2,426 Fellows, or 19 per cent of the total.

Questions are frequently asked regarding the requirements for Fellowship and the following statement outlines the provisions of the By-laws governing qualification and election.

Persons who have been members of the Association for at least two years and who have reached their 30th birthday are eligible to apply if, in their opinion, they meet the conditions of one or more of the six clauses in the By-laws defining "an established professional standing." These six possible approaches are as follows:

a. A person who has rendered acceptable service for two or more years in a responsible public health position and who has been awarded in course a degree of Doctor of Public Health, Doctor of Science in Public Health, Doctor of Philosophy in Public Health, Doctor of Medicine with at least one year of graduate study in public health in a university, Master of Public Health, Diploma in Public Health, or other equivalent degrees, according to standards approved by the Executive Board of the American Public Health Association.

b. A person who has been awarded in course an academic or professional degree involving training in public health and who has been regularly engaged in health work for at least five years, having rendered meritorious service as a health officer or in responsible charge of work in either a public or private health agency.

c. A person who has done notable original work in public health or preventive medicine of a character to give him a recognized standing.

d. A person regularly engaged in health work for at least five years, who has given evidence of special proficiency, who has attained a recognized standing.

e. A teacher of public health or one of its constituent sciences who has attained distinction as an expounder of the principles of public health or its constituent sciences. Such a teacher shall have had at least five years' experience as a teacher of public health subjects. Any years of experience as defined in paragraphs "b" and "d" that the applicant may have had shall be considered the equivalent of the same number of years' experience as a "teacher."

f. A person not covered by the above, who has made substantial contributions to public health work in his chosen branch, who has attained a recognized professional standing.

Persons wishing to apply should request a Fellowship application blank from the American Public Health Association Membership Department, 1790 Broadway, New York 19, N. Y. Applications are accepted up to August 1 each year for consideration by the Governing Council at the fall meeting. It is important to make clear that members themselves should take the initia-

tive in submitting such applications. Neither the Sections nor the A.P.H.A. administrative staff are authorized to solicit applications. This means that, although over 3,000 persons have been duly recognized with this grade of affiliation since 1922, there are other persons well qualified who have never initiated the process of applying for Fellowships. It should be clear that members should not await action by others if they wish to attain Fellowship. It is necessary and proper for them to take the first step.

An application for Fellowship requires sponsorship by two Fellows of the Section with which the applicant desires to be affiliated. These personal signatures are to be obtained by the applicant before submitting the completed application. The A.P.H.A. office will assist, on request, in determining the Section with which prospective sponsors are affiliated. Applications from persons not wishing to be identified with a particular Section and requesting unaffiliated Fellowship may be sponsored by any two Fellows of the Association.

When properly sponsored and otherwise completed, the application is sent to the A.P.H.A. office, after which the list of persons applying is published in the *American Journal of Public Health*, usually in the September issue, but in any case not less than 15 days before the date for the Annual Meeting. An established routine is followed for review by the Section Councils (unaffiliated applications are reviewed by the Executive Board) and by the Committee on Eligibility. This Standing Committee of the Association is made up of one Fellow from each of the 13 Sections, plus a Chairman elected by the Executive Board. This group is under instructions from the Governing Council to examine each application in accordance with the provisions of the clause of the By-laws chosen by the applicant, and to apply the criteria with precision in each case. Final election is by the Governing Council at the second meeting at each annual session.

The privileges of Fellowship include eligibility to serve as an officer of the Association or one of the Sections, Chairman of an Association or Section Committee (over one hundred in number), a member of one of the four Standing Committees, a member of the Governing Council or Executive Board, and the right to vote on amendments to the Constitution. Some Civil Service and merit system records depend upon Fellowship in the American Public Health Association as an achievement deserving recognition in applicants.

The dues of Fellows are $12.00 annually, and include a subscription to the *American Journal of Public Health* and other services to which members are eligible. Life membership is available at $200, covering all future annual dues.

Applications for Fellowship to be considered at the 79th Annual Meeting in San Francisco, California, October 29–November 2, should be filed with the Association as soon as they are completed, and in any case not later than August 1. For further information, address the Membership Department, American Public Health Association.

Each Member and Fellow of the A.P.H.A. is urged to fill in and return promptly the Membership Directory information card that was sent with the recent Association Newsletter.

TESTIMONY BY HUGH R. LEAVELL, M.D., CHAIRMAN, EXECUTIVE BOARD, AMERICAN PUBLIC HEALTH ASSOCIATION, BEFORE THE HOUSE OF REPRESENTATIVES COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE ON THE LOCAL HEALTH UNITS BILLS H.R. 274 AND H.R. 913

APRIL 12, 1951

The American Public Health Association welcomes this opportunity to appear before the Committee on Interstate and Foreign Commerce in support of pending proposals to provide federal aid to states and localities for the extension of local health services.

The American Public Health Association is the professional society of public health workers, made up of 12,500 members and Fellows, representing the leadership among those who actually deal with public health services at the federal, state, and local levels. The testimony which I shall present goes back to official and considered action of the Governing Council of the Association, taken on several occasions during the last ten years and represents the deliberate opinion of students of this problem who see it at first hand. I speak as Chairman of the Executive Board of the Association on a subject with which I have many dealings in my capacity as Professor of Public Health Practice in the Harvard School of Public Health in Boston.

There is a continuity of support by the American Public Health Association for federal legislation relating to local health units extending now over almost ten years. We have sponsored definitive studies of this entire subject. In our opinion this legislation deserves top priority among current measures before Congress affecting the public health.

Last fall the Association, in coöperation with the other major professional associations in the health field and with many other well informed groups, strongly urged the adoption of federal legislation providing for financial support of essential, full-time local health services. We have repeatedly placed before committees of the Congress complete documentation of this need.

The Association believes that the immediate development of such services is not only requisite to the safeguarding of the health of the nation in normal peace time, but is given even greater urgency by the current demands for the establishment of adequate civilian defenses against possible acts of aggression, including atomic, biological, chemical, and other devices of warfare directly affecting the civilian population.

I am authorized by the Association to confirm the support which the Association has consistently given to the principles behind this legislation and in particular to the general provisions of the bill now known as S. 445, which bill, in the opinion of the Association, seeks to attain the end of complete coverage of the nation by full-time local health services through entirely practicable means.

It is the considered opinion of the Association that the necessary safeguards to protect state and local autonomy, in which we firmly believe, are amply provided in these bills. Experience that has extended over many years in federal-state relationships gives us reason to believe that the established pattern operating under these bills would give full protection to states and localities from undue federal domination.

In brief, the Association regards the House of Representatives versions of this bill (H. R. 274 and H. R. 913) as somewhat less complete and less satisfactory than S. 445 which has been passed by the Senate. Even though these House bills represent a considerable proportion of the goal which we seek, it is the opinion of the Association that the Senate version is distinctly preferable and it is hoped that conference negotiations between the two Houses of Congress may resolve the differences in favor of the pattern of S. 445.

The reasons underlying our preference for the Senate version grow out of serious doubts which we have about the wisdom of writing into this proposed law limitations as to what localities can properly do in the field of public health. We believe that it would be much more appropriate for federal legislation to define *minimum* standards rather than to define upper limits or ceilings.

We recognize that it is quite appropriate for Congress to indicate the purposes for which federal funds are to be used, but we maintain that it is not appropriate for Congress to say what the localities shall do for themselves. It is manifest that limits on health services imposed throughout the nation are not in the public interest.

We lay great stress on the definition of local public health services and we submit for the record a carefully worked out statement of modern public health practice which defines these services in terms of their present-day acceptance. (The Local Health Department—Services and Responsibilities. *A.J.P.H.* 41, 3:302–307 (Mar.) 1951.)

We believe that the way in which local public health service is defined is a matter of very great importance. The members of the Committee will, of course, agree that such

definition is the province of state and local government and not of the federal authorities. Our system of constitutional government reserves this power to the states and only those favoring centralization beyond the provisions of our Constitution would suggest otherwise.

Further, it is essential to recall that public health agencies have been set up by the people themselves to look after the major health problems which beset them at any given time. It would be not only absurd but definitely not in the public interest to propose a restrictive definition of public health that would make it illegal to deal with health problems of pressing importance to the people for which they wish to make provision by organized community effort under the leadership of their local health departments. Such restrictive definitions would mean that our local services would be designed to deal with problems of the 19th century instead of today. One may very well recall the horse and buggy days with pleasure and wish for their return, but it is unlikely that the American people wish to have horse and buggy health departments to deal with the health problems that face them right now.

Both H. R. 274 and H. R. 913 define "basic health services" on page 5, line 1, and they include in the definition the prohibition of certain types of health activity. These bills further provide that certain sums may be made available from federal funds to local health departments which operate in accordance with these definitions of basic health services. The logical interpretation of these provisions of the bills is that any health department which provides services excluded by the definition shall not receive federal financial aid. Actually nearly every health department now operating in the country would be excluded, which may very well be the objective of those proposing even more restrictive definitions.

For example, the City of Boston Health Department, with which I happen to be familiar, provides dental diagnosis and treatment for indigent school children. Boston would be excluded from receiving federal funds even though the dental program were financed by local monies. Some 40 other cities, including Louisville, San Francisco, Denver, Richmond, Philadelphia, Detroit, and Washington, also conduct through their health departments programs for the indigent of their communities and it is presumed that they would likewise be excluded from this federal aid because they would not conform to a restrictive and federally-imposed definition.

Since all these communities have decided by local action to provide these types of services for unfortunate members of their citizenship, such federal restrictions seem to us to be federal dictation with a vengeance. They could be suggested only by those who wish to make the bills so restrictive that no conscientious legislator could persuade himself to vote for them.

It is important to recall constantly that public health work is carried on by and for the people. In the Commonwealth of Massachusetts, for example, there is a conspicuous illustration of this fact. Not so many years ago it was evident that cancer was causing a great many deaths and much suffering. Some of the citizens of Massachusetts proposed that something should be done about the situation and finally, after strong public pressure, the legislature passed a law setting up a Division of Cancer Control in the State Health Department, directing that the program be carried on with or without coöperation of the medical profession. This law was actually opposed by the State Commissioner of Health at that time because he feared the opposition of the Medical Society. However, since the law has been in operation the medical profession has coöperated and a very useful program has been developed to serve as a model for many other states. This is an example of the people taking matters into their own hands and demanding action to meet their demonstrated needs. This is the democratic approach at the local level; this is the truly American way of life which would be so seriously curtailed if H. R. 274 and H. R. 913 with their restrictive definitions were to become law.

In this connection it is gratifying to find that the American Medical Association, through its officially adopted program for the advancement of medicine and public health, repeatedly emphasizes the necessity for local determination of needs. The American Medical Association has commended the provisions for local administration and control as provided by the National Hospital Survey and Construction Act. We thoroughly support the emphasis on local administration and local responsibility as urged by the professional society of physicians. We, too, want to see "adequate support with funds free from political control, domination and regulation." These are some of the reasons we strongly oppose an attempt to write in limitations and ceilings. We cannot support federal legislation which will curtail the freedom for states and localities to decide these matters, for that is where these determinations really belong.

We are happy to see that both the Senate and House versions propose to continue in operation the successful plan of coöperation between the Surgeon General of the Public Health Service and the state health officers which has been in operation for more than 15 years. It is a notable fact that this coöperative understanding has worked well and has never

required resort to court action. We believe it manifest that states rights have been well protected and we support the testimony of the Association of State and Territorial Health Officers before your honorable Committee, testifying to the merit of the existing relationships. This is a proven and workable arrangement which should not be disturbed.

The record shows that federal grants to states have served to stimulate non-federal support for necessary health services.

In 1937, for instance, 45 per cent of all expenditures by state and local health departments was from federal sources. In 1946 the proportion from federal sources had dropped to 28 per cent. This record of decreasing dependence on federal aid adds another reason to our support of the principle.

It is a notable fact that the principles underlying this legislation have received extraordinarily wide support from professional groups, from citizens groups, and from agencies with a special interest like those concerned with the control of tuberculosis, for it is clearly recognized that we must provide the basic services for public health before special problems can be met. These basic services include health education and information, public health laboratory services, services concerned with vital statistics, communicable disease control, environmental sanitation, maternal and child health, and services for detection of chronic diseases. Otherwise it is exceedingly difficult to reduce effectively the numbers of those who are ill and who die from specific diseases like tuberculosis. This citizen support, I repeat, coming from the grassroots represents a sustained and notable demand. These services are indeed essential to the security and health of our country. Adequately staffed and properly equipped public health units in every locality are as essential for our national well-being as are public schools in every locality.

A turkey farmer in southern Colorado recently speaking to a group of his fellow citizens told of the prompt response he received from the State Agricultural College 250 miles away when he wired them that he had some sick turkeys. Two turkey specialists flew down to advise him. He was most grateful and knew that such service grew out of generous federal assistance to land grant colleges. He pointed out, however, that no such service was available for sick children and said that when people had epidemics they should be as important as turkeys.

It should therefore, we believe, clearly be the policy of the Congress and the purpose of this legislation, in the promotion of the general welfare and in the interest of national security, to assist the states through the measures provided in these bills to develop and maintain local health units organized to provide basic full-time public health services in all areas of the nation and for the training of all types of personnel for state and local public health work.

POLIO AND IMMUNIZATIONS

The attention of the Committee on Research and Standards has been directed to published reports, mostly in the British press, tending to show a possible relationship between the occurrence of poliomyelitis and recent immunization. The Committee felt that the problem was one of vital importance to the public health professions, not only from the viewpoint of prevention of poliomyelitis but also for the adverse effect any proven relationship might have on immunization programs against smallpox, diphtheria, whooping cough and others so much a part of today's public health. At the last meeting of the committee an *ad hoc* subcommittee was appointed to consider the problem and to report to the Committee on Research and Standards with recommendations. This special subcommittee has considered the subject and has submitted a report which has been accepted by the Committee on Research and Standards as follows:

"Recent published and unpublished data strongly suggest that an individual who develops poliomyelitis within a month after receipt of an injection of an antigen, or possibly of some other material, shows an increased frequency of paralysis in the extremity into which the injection has been given. There are also suggestions that among the reported cases of poliomyelitis are cases 'which would not have been clinically diagnosed as poliomyelitis at all if their (recent) inoculation had not brought them into the paralytic group.'

"Although further studies on these questions are imperative, the data so far available would suggest that, in the face of an abnormal prevalence of poliomyelitis in a given locality, antigen inoculations may well be postponed until after the subsidence of the abnormal prev-

alence. It should be stressed, however, that there is no evidence that this effect of inoculation persists for more than one month. On the contrary, the risk of poliomyelitis among persons who have been immunized more than one month before onset is no greater than among non-immunized persons."

Gaylord W. Anderson, M.D., was Chairman of the *ad hoc* subcommittee which prepared the original report. Other members of the committee were: W. Lloyd Aycock, M.D.; Paul M. Densen, D.Sc.; Robert F. Korns, M.D.; and Ralph S. Muckenfuss, M.D. William McD. Hammon, M.D., is chairman of the Committee on Research and Standards.

TEN YEARS OF THE ACORN'S GROWTH

Lillian D. Long, Ph.D., Director of the A.P.H.A. Merit System Service, has reported that there are now 27 states, 3 cities, 1 territory, 2 counties and 2 state crippled children's programs participating in the Annual Service Plan. This plan makes it possible for an agency to order any number of available examinations during the contract period of one year for a fixed fee. Scoring service and statistical information relating to the examinations are provided. There are more than 41,000 examination questions now in the files, and more than 1,500 examinations have been used by 41 states and 12 cities. In February alone, 653 answer sheets were scored by the statistical department.

Probably the most significant result of this service in the field of personnel selection, according to Dr. Long, is the changed attitude on the part of those who take the examinations. In the early years there was reluctance, and often apprehension and uncertainty, among the candidates required to take written tests. To many public health workers it was an entirely new experience, and to some an incomprehensible requirement. Now written tests are widely accepted by public health workers as a necessary step in job appointment. Complaints are few and the general opinion regarding the process seems to be that the examination is an expected routine and that the tests themselves are "hard but fair."

During the 10 years the Service has been in operation, the staff has grown from a part-time statistician, a part-time consultant, and a secretary to a full-time director, a full-time field consultant, 23 part-time subject-matter consultants, 2 test technicians, 2 statisticians, a business manager, and 12 secretaries and clerks. About 3,000 professional persons have assisted in constructing and reviewing examination questions.

The Service has also expanded to include inservice tests for staff nurses, tests for public health and public health nursing students to be used for guidance purposes, tests for state licensing boards and the examination used as one step in certifying specialists of the American Board of Preventive Medicine and Public Health. Suggestions for new uses for the test materials are always welcome.

These facts are summarized from *What Do You Know*, a newsletter initiated by the Merit System Service in March, 1951, for occasional publication.

HOSPITALIZATION OF COMMUNICABLE DISEASES

The Committee on Research and Standards has been studying the possibility of caring for communicable diseases in general hospitals for the past three years under the refereeship of Alfred L. Burgdorf, M.D., Hartford, Conn. A preliminary report was submitted by Dr. Burgdorf to the committee during the Annual Meeting in 1948 and was published in the *Journal* (See Hospitalization of Cases of Communicable Diseases Together with Certain Considerations of the Isolation Techniques and Nursing Procedures Used, pp. 1289–1294 (Oct.), 1949). Comments received subsequent to the publication of the report demonstrated the

desirability of a general discussion of the subject by individuals representing the principal interested groups. Invitations were extended by the American Public Health Association to the following organizations to establish a Conference Committee on the Hospitalization of Communicable Diseases in General Hospitals: American Academy of Pediatrics, American Hospital Association, American Medical Association, American Nurses' Association, Canadian Hospital Council, Joint Orthopedic Nursing Advisory Service, National Foundation for Infantile Paralysis, and National Tuberculosis Association.

On April 20 the Conference Committee met in New York. Funds to cover necessary travel expenses for attendance were provided by the National Foundation for Infantile Paralysis, Inc. An editing committee is preparing a statement of recommendations made during the conference. The complete report will appear in a later issue of the *Journal*. The individuals who participated and the organizations they represented were:

American Academy of Pediatrics
- Harold Abramson, M.D., Epidemiologist, New York City Health Department
- William L. Bradford, M.D., Associate Professor of Pediatrics, University of Rochester
- Glidden L. Brooks, M.D., Coordinator of Hospitals, University of Pittsburgh Medical Center
- Clifford G. Grulee, Jr., M.D., Department of Pediatrics, The Tulane University of Louisiana School of Medicine
- Helen W. Wallace, M.D., Chief, Midwifery and New-born Division, New York City Health Department

American Hospital Association
- Katharine G. Amberson, R.N., Consultant, National League of Nursing Education
- Irving F. Klein, M.D., Medical Superintendent, Sea View Hospital, New York City Department of Hospitals
- F. F. Schwentker, M.D., Pediatrician-in-Chief, The Johns Hopkins Hospital

American Medical Association
- John F. Landon, M.D., Visiting Physician and President of Medical Board, Willard Parker Hospital, New York City

American Nurses' Association
- Agnes E. M. Anderson, R.N., Assistant Executive Secretary, A.N.A.
- Elizabeth A. Edwards, R.N., Assistant Executive Secretary, A.N.A.

American Public Health Association
- Alfred L. Burgdorf, M.D., Director of Health, Hartford Department of Health, Chairman
- James P. Dixon, Jr., M.D., Director, Bureau of Health and Hospitals, City and County of Denver
- Robert Albrecht, M.D., Associate Public Health Physician, Bureau of Epidemiology and Communicable Disease Control, New York State Department of Health

Canadian Hospital Council
- L. O. Bradley, M.D., Executive Secretary

Joint Orthopedic Nursing Advisory Service
- Louise Suchomel, R.N., Consultant in Orthopedic Nursing, National Organization for Public Health Nursing

National Foundation for Infantile Paralysis
- Kenneth S. Landauer, M.D., Director of Medical Services
- Frank vanDyke, Medical Administration Consultant

National Tuberculosis Association
- Floyd M. Feldmann, M.D., Assistant to the Managing Director

CONGRESS OF INDUSTRIAL MEDICINE

The American Public Health Association has been invited to participate in the Tenth International Congress of Industrial Medicine to be held in Lisbon, Portugal, September 5–15, 1951. Fellows and members of the Association expecting to attend the Congress are asked to communicate with the Executive Secretary of the A.P.H.A.

SOUTHERN BRANCH AT BILOXI

"Curbstone consultations" is the name given a bold and interesting attempt to have a better meeting in Biloxi, Miss., April 26–28. Most of the over 700 people who attended thought the method was reasonably successful and definitely want to try it again. For two half-days the only scheduled program was the availability of nearly 200 consultants who alternated in some 30 booths. The intent was to provide full opportunity for those attending the meeting to discuss their particular problems in detail

with qualified people under favorable circumstances. The method certainly warrants serious consideration and further experimentation. Two general sessions and a half-day of particularly good sectional meetings completed the program. The Mississippi Public Health Association held a day of individual meetings preceding the combined meetings.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Donald A. Champaign, M.D., Court House, Kelso, Wash., District Public Health Officer, Cowlitz-Wahkiakum District Public Health Dept.

Leonard J. Duhl, M.D., Div. of Tb., F. S. Bldg., South, Washington 25, D. C., Asst. Surgeon(R), U.S.P.H.S.

Henry C. Finch, M.D., 3605 Kingsbridge Ave., New York 63, N. Y., Student, Columbia Univ., School of Public Health

Carlos Vieira de Freitas, M.D., S.E.S.P., Caixa Postal 201, Vitoria, Est. Santo, Brazil, S. A., Responsavel pelo S.D.T., do Centro de Saude de Governador Valadares, S.E.S.P.

G. Nelson Furbeck, M.D., Jefferson Davis Parish Health Unit, Jennings, La., Director, State Dept. of Health

Gordon K. Martin, M.D., D.P.H., Muskoka District Health Unit, Box 670, Bracebridge, Ont., Canada, Director

Tylson King de Mello, M.D., S.E.S.P., Caixa Postal 621, Belem, Para, Brazil, S. A., Chief of Sanitary District, S.E.S.P.

Robert F. Plotkin, M.D., Div. of Tb., F.S. Bldg., South, Washington 25, D.C., S.A. Surgeon(R), U.S.P.H.S.

Lee A. Rademaker, M.D., 502 N. Division St., Salisbury, Md., Private Practice, Surgeon

Laboratory Section

James M. Allen, 923 S. Robberson, Springfield 4, Mo., Laboratory Technician, Div. of Health, S.W. Branch Laboratory

James L. Day, 4015 N. Classen, Oklahoma City, Okla., Asst. Bacteriologist, State Dept. of Public Health

M. C. Dinberg, M.D., C.M., Oil City Hospital, Oil City, Pa., Pathologist

Abraham J. Eismann, 104-01 Roosevelt Ave., Corona, N. Y., Owner of "Pathological Laboratory"

George H. Fetterman, M.D., Childrens Hospital, DeSota St., Pittsburgh 13, Pa., Pathologist

Madge Reynolds, Georgia Dept. of Public Health, Atlanta, Ga., Bacteriologist

James H. Savage, Box 750, Fairbanks, Alaska, Senior Bacteriologist, Alaska Dept. of Health

Frank M. Schabel, Jr., Ph.D., 1520 Valley Ave., Birmingham 9, Ala., Microbiologist, Baptist Hospital

Fred H. Schultz, Jr., Phar.D., Commercial Solvents Corp., Terre Haute, Ind., Director, Pharmaceutical Research

Hulda B. Vinson, Venereal Disease Research Laboratory, Box 185, Chamblee, Ga., Bacteriologist

Janet R. Whitesell, 2425½ West Douglas, Wichita 12, Kan., Asst. Bacteriologist, Wichita-Sedgwick County Health Dept.

Samuel S. Zuckerman, M.D., Hynds Bldg., Cheyenne, Wyo., Pathologist, Zuckerman Laboratory

Statistics Section

Lilian St. Clair Blackford, Health Dept., City Hall Annex, Richmond, Va., Clerk-Statistical, Richmond City Health Dept.

Bertha C. Boschulte, M.P.H., Box 753, Charlotte Amalie, Virgin Islands, U.S.A., Statistician, Virgin Islands Dept. of Health

Maurine E. Lamm, 2015 Commerce, Dallas 1, Tex., Deputy Registrar, Vital Statistics, City Health Dept.

Dr. Benjamin Ron Monroy, Allende No. 69, Aguascalientes, Ags., Mexico, Public Health Service, Aguascalientes State, Mexico

Margie Spencer, 3501 McFarlin, Dallas, Tex., Sr. Secy., Dallas County Health Dept.

Engineering Section

Raymond P. Bessler, R. B. Sanitation Service Co., Hawkins, Wis., Owner

Joseph P. Blanks, 2002 Paris Drive, Columbus, Ga., Public Health Engineer, Muscogee County Health Dept.

Norman E. Damron, 45 Essex Ave., Bernardsville, N. J., Student, Harvard Graduate School

Edgar L. Duck, 123 Maple St., Jackson, Tenn., Sanitation Consultant, Tennessee Dept. of Public Health

Paul C. Laux, City Hall, Room 107, Columbus, Ohio, Supt., Division of Water

Paul P. Maier, 2101 Potrero St., Richmond 3, Calif., Sanitary Engineer(R) U.S.P.H.S. (CDC)

Richard S. Mansfield, 703 Mayes Ave., Sweetwater, Tenn., Student, Indiana Univ.

F. W. Milliken, 2634 Gladstone Drive, Dallas, Tex., Senior Sanitarian, Dallas Health Dept.

Benjamin D. Stinson, 524 South 7th St., Kingfisher, Okla., Sanitarian, Kingfisher County Public Health Dept.

Ralph Stone, M.S., 2562 Westgate Ave., Los Angeles 64, Calif., Sanitary Engineer, Institute of Inter-American Engineers, IIAA

Harold W. Wolf, M.S., P.O. Box 270, Thomasville, Ga., Jr. Asst. Sanitary Engineer, U.S.P.H.S.

Industrial Hygiene Section

Harwood S. Belding, Ph.D., Univ. of Pittsburgh, Graduate School of Public Health, Pittsburgh 13, Pa., Professor of Environmental Physiology

Lt. Herbert E. Christensen, M.S.C., Army Environmental Health Laboratory, Army Chemical Center, Md., Toxicologist

Herbert E. Dux, Pennsylvania Glass Sand Corp., Hancock, W. Va., Chief Engineer

L. Mason Lyons, M.D., 135 W. 16th St., New York 11, N. Y., Medical Director, Wright Aeronautical Corp., Wood-Ridge, N. J.

C. Richard Walmer, M.D., Mellon Institute, 4400 Fifth Ave., Pittsburgh 13, Pa., Managing Director, Industrial Hygiene Foundation at Mellon Institute

Food and Nutrition Section

George R. Chamlin, 2068 W. Ogden Ave., Chicago 12, Ill., President, Continental Chemiste Corp.

Nettie Karansky, M.P.H., 2230 Witherell, Detroit 1, Mich., Nutritionist, Detroit Dept. of Health

Maternal and Child Health Section

Stanley C. Best, M.D., 2058 Montague St., Regina, Sask., Canada, Director, Div. of Child Health, Saskatchewan Dept. of Public Health

Nina Bleiberg, M.D., 41-53 49th St., Long Island City 4, N. Y., Consultant Pediatrician, Div. for Physically Handicapped Children, Dept. of Health, New York, N. Y.

Abraham Drobny, M.D., San Vicente 5877, Santiago. Chile, S. A., Under-Secretary Ministry of Public Health in Chile

Jean R. Goorman, M.D., 1816 Harrison Ave., New York 53, N. Y., Student, Columbia Univ.

Kenneth S. Nolan, M.D., 5630 Sheridan Road, Chicago, Ill., Director, Div. of Health Services, Chicago Board of Education

Jessie E. Parkinson, M.D., 90 Greenwood St., New Haven, Conn., Student, Yale School of Public Health

Margarete E. Steinthal, M.D., 16 Lessingstrasse, Stuttgart, Germany, Physician, Health Dept., Stuttgart

Mary H. Swanberg, M.D., 5759 Dorchester Ave., Chicago 37, Ill., Student, Johns Hopkins School of Hygiene and Public Health

Crayton Walker, M.A., 728 Stelzer Road, Columbus, Ohio, Administrative Asst., Div. of Child Hygiene, Ohio Dept. of Health

Chin Mau Wang, M.D., M.P.H., Provincial Keelung Hospital, Keelung, Formosa, Supt.

Azelie H. Ziegler, M.S., 5222 Perrier St., New Orleans, La., Medical Social Consultant, Louisiana State Dept. of Health, Training Center

Public Health Education Section

H. May Amritt, 1442 Washington Heights, Ann Arbor, Mich., Student, Univ. of Michigan School of Public Health

Harvey M. Burnette, State Board of Health, P.O. Box 210, Jacksonville, Fla., Field Representative

Paul I. Byrne, M.A., 410 Jefferson St., Jefferson City, Mo., State Representative, National Foundation for Infantile Paralysis

Therese Conlon, 6 Pleasant St., Malden, Mass., Exec. Secy., Malden Tuberculosis and Health Assn.

Ferne Fehlmann, M.P.H., 607 E. 4th St., Cheyenne, Wyo., Health Education Consultant, State Dept. of Public Health

Brevitt Hook, M.S.P.H., Prospect Hill, N. C., Sr. Sanitarian, Alamance County Health Dept.

Robert L. Johnson, Box 2106, Yale Station, New Haven, Conn., Health Educator in Training, New York State Dept. of Health

Merrill F. Krughoff, M.A., 155 E. 44th St., CC&CA, New York 17, N. Y., Director, Health and Welfare Planning Dept., Community Chests and Councils of America

Malcolm A. Mason, M.P.H., R.R. 10, Lafayette, Ind., Health Education Consultant, State Board of Health

Daniel M. Perry, 343 W. Fedora Ave., Fresno 5, Calif., Sanitarian, Fresno County Health Dept.

Mabel S. Rickett, 3921 15th, N.E., Seattle 5, Wash., Student, Univ. of Washington

Willie Catherine Rogers, 507 Carondelet St., New Orleans, La., Director of Health Education, New Orleans Health Dept.

Marcia Rosenstein, 390 Ivy Lane, Englewood, N. J., Secy., Columbia Univ., College of Physicians and Surgeons

Marian M. Simmons, 318 Carondelet St., New Orleans, La., Exec. Secy., Louisiana Div., American Cancer Society

J. Harper Wetherington, Rt. 2, New Bern, N. C., Sr. Sanitarian, Craven District Health Dept.

Public Health Nursing Section

Sister Adele, 20 Belvidere, Boston, Mass., Staff Nurse, St. Cecilia's Visiting Nurse Service

Mary E. Borthwick, R.N., Legion Hall, State Nurses Office, Montrose, Pa., County Supervisor

Florence Coe, 26 Holmes St., Poughkeepsie, N. Y., Asst. District Supervising Public Health Nurse, State of New York Dept. of Health

Mary Elizabeth Decker, M.A., 115 Spring St., Clarks Green, Pa., Exec. Director, Visiting Nurse Assn.

Katherine C. Engles, M.A., 28 Stebbins Ave., Staten Island 10, N. Y., Staff Nurse, Farm Colony Hospital

Marjorie W. Falconer, R.N., Bryn Mawr Drive, Dallas, Tex., School Nurse, Board of Education

Susie Fleming, R.N., Box 93, Grove Hill, Ala., Public Health Nurse, Clarke County

Blanche Garwood, 544 St. Joseph St., Saugatuck, Mich., Public Health Nurse, Allegan County

Ruanna S. Gordon, 1946 N. Main, Dayton 5, Ohio, Exec. Director, The Visiting Nurse Assn.

March W. Hamilton, Box 597, Eureka, Kan., Staff Nurse, Bi-County Health Dept.

LaVeta V. Judy, R.N., City-County Public Health Office, Vincennes, Ind., Knox County Public Health Nurse

Sister Mary Macrina, R.N., 2217 E. Grand Blvd., Detroit 11, Mich., Nurse Administrator, Mercy School of Nursing

Luella Omark, R.N., 1200 E. Fairmount St., Milwaukee 11, Wis., Acting Senior Nurse, Whitefish Bay Health Dept.

Helen B. Paprik, P.O. Box 325, Carlton, Minn., Public Health Nurse, Rural St. Louis County Health Dept.

M. Elizabeth Pickens, 3706 N. Charles St., Baltimore 18, Md., Asst. Director, Bureau of Public Health Nursing, City Health Dept.

Kathryn Richardson, 602 S. 16th, Mt. Vernon, Ill., School Nurse, Mt. Vernon City Schools

Betty Sherwood, M.P.H., 4375 Saratoga, San Diego 7, Calif., Educational Director, Visiting Nurse Assn. of San Diego and LaJolla

Jean Stair, M.A., 5257 Cass, Detroit, Mich., Asst. Professor of Nursing, Wayne Univ. College of Nursing

Melba L. Udden, 8606 Fairview Lane, Hayward, Calif., Public Health Nurse, Alameda County Health Dept.

Nona S. Van Pelt, R.N., 711½ E. 7th St., Jeffersonville, Ind., Supervisor of Nurses, Clark County Health Dept.

Alice M. Yeagle, R.N., 6973 Pinehaven Rd., Oakland 11, Calif., Supervisor, Crippled Childrens Services, Alameda County Health Dept.

Epidemiology Section

Jane E. Coulter, 333 W. 78th St., New York 24, N. Y., Research Asst., Milbank Memorial Fund

Richard P. Dow, Ph.D., Box 270, Thomasville, Ga., Entomologist, U.S.P.H.S.

Ruperto Huerta, M.D., Inglaterra 1480, Santiago, Chile, S. A., Officer in Typhus Control, Chilean Public Health Service, Epidemiological Service

Delmas K. Kitchen, M.D., 630 Fifth Ave., Bristol-Myers Co., New York 20, N. Y., Chief, Medical Council, Bristol Laboratories

Sung Jui Liao, M.D., D.P.H., 333 Cedar St., New Haven, Conn., Asst. Professor of Preventive Medicine, Yale Univ., School of Medicine

Antonio A. Lozano, M.D., M.P.H., 256 Icaza, San Miguel, Manila, Philippines, Physician, Manila Rapid Treatment Center, Manila Health Dept., Division of Social Hygiene

Ralph S. Paffenbarger, Jr., M.D., P.O. Box 270, Thomasville, Ga., Sr. Asst. Surgeon, Communicable Disease Center, U.S.P.H.S.

Leon Szyfman, M.D., 55 Shattuck St., Boston, Mass., Fellowship, School of Public Health, Harvard Univ.

School Health Section

Warren R. Johnson, Ed.D. College of Physical Education, Univ. of Maryland, College Park, Md., Assoc. Professor, College of Physical Education, Recreation and Health

Muriel M. Lomax, M.A., School District of St. Joseph., 10th & Felix, St. Joseph, Mo., Director, Health and Physical Education

Charles D. Merrill, Ph.D., Dept. of Health Education, State Univ., Tallahassee, Fla., Asst. Professor of Health Education

Carolyn Wolf, R.N., 804 Austin, Brownwood, Tex., Director of Health and Safety, Brownwood City Schools

Dental Health Section

Grace Browning, P.O. Box 2591, Birmingham, Ala., Dental Health Education, Jefferson County Dept. of Health

Louis Goldblatt, D.D.S., M.P.H., 314 W. 90th St., New York 24, N. Y., Dentist

William R. Harkins, D.D.S., Fulton Bldg., Osceola Mills, Pa., Dentist

Matthew Mitchell, D.D.S., 103-654 Girard St., N.W., Washington, D. C., Dentist

Dr. Maria Ines Navarra, Convencion 1412, Apt. 9, Montevideo, Uruguay, S. A., Jefe de Clinica in Hygiene and Dentistry for Children in Dental School in Montevideo

Jean Newlin, M.S., 3927 Locust St., Philadelphia 4, Pa., Instructor, School of Oral Hygiene, Dental School, Univ. of Pennsylvania

W. Philip Phair, D.D.S., M.P.H., 236 North Harlem Ave., Glenview, Ill., Asst. Secy., Council on Dental Health, American Dental Assn.

Max H. Schoen, D.D.S., 314 N. Harper Ave., Los Angeles 48, Calif., Private Practice

Dr. Harry J. Watson, Sr., 231 W. Wisconsin Ave., Milwaukee 3, Wis., Dentist

Medical Care Section

Kenneth G. Coleman, 166 N. Citrus Ave., Los Angeles 36, Calif., Asst. Hospital Administrator, Paradise Sanatorium

Jacques Cousin, M.S., 133 East Ave., Rochester 4, N. Y., Asst. Director, Council of Rochester Regional Hospitals

James R. Davidson, M.S., 1141 Glen Arbor Ave., Los Angeles 41, Calif., Asst. District Supervisor, Bureau Vocational Rehabilitation

John R. Hill, 216 Dome Bldg., Chattanooga 2, Tenn., Exec. Director, Tennessee Hospital Service Assn.

Edward Kirsch, M.D., C.M., 170 Bell Road, Scarsdale, N. Y., Exec. Director, Lebanon Hospital

Katharine Lyons, A.M., State Dept. of Public Health, Cheyenne, Wyo., Medical Social Consultant

F. Lloyd Mussells, M.D., C.M., Strong Memorial Hospital, Rochester, N. Y., Asst. Director

Robert Van Hyning, 1835 Phelps Place, N.W., Washington, D. C., Medical Division, United Mine Workers of America, Welfare and Retirement Fund

Unaffiliated

Edward P. Carter, Jr., Sonotone Corp., Elmsford, N. Y., Chief, Dept. of Audiometry and Fitting Technique

Arthur E. Cohen, M.S., 44 Oakland St., Lowell, Mass., Student, Univ. of Oklahoma

Marcia Cooper, Ph.D., 615 N. Wolfe St., Baltimore, Md., Asst. Professor in Public Health Administration, Johns Hopkins School of Hygiene and Public Health

G. B. Fox, The Hobart Mfg. Co., Troy, Ohio, Manager, Special Engineering Division

Max Fuchs, D.M.D., 1605 Walton Ave., New York 52, N. Y., Director, Division of Research, National Council to Combat Blindness

Christine E. Lazzarine, R.N., Germantown Hospital, Philadelphia 44, Pa., Director, School of Nuns and Nursing Service

Colonel Frank M. Lee (D.V.M.), 3618 Hanson Rd., Columbia 4, S. C., State Public Health Veterinarian, State Board of Health

Robert B. Murray, Jr., 611 Blackstone Bldg., Harrisburg, Pa., President, Pennsylvania Economy League, Inc.

A.P.H.A. membership application blank on page XXIX.

79TH ANNUAL MEETING

San Francisco, Calif., Oct. 29–Nov. 2, 1951

A HOUSING BUREAU has been organized for the 79th Annual Meeting of the A.P.H.A. in San Francisco, October 29 to November 2. Since all requests for rooms are handled in chronological order, it is recommended that you send in your application as quickly as possible.

PLEASE COMPLETE THE APPLICATION FORM ON PAGE 754 GIVING *ALL* INFORMATION REQUESTED.

HOTELS HOLDING ROOMS FOR A.P.H.A. AND RATES.

Map	*Hotel*	*Single*	*Double Rooms* *Double Bed*	*Twin Beds*
1	Alexander Hamilton *	$5.00–10.00	$ 6.00–10.00	$ 7.00–10.00
2	Bellevue *	5.00– 6.00	7.00– 8.00	7.00– 9.00
3	Beverly Plaza	4.50– 6.00	6.50– 8.00	6.50– 8.00
57	Biltmore	4.00–	5.00	6.00
4	Brayton	2.50– 3.00	3.00– 4.00	4.50– 5.00
6	Californian *	4.00– 5.80	6.00– 7.30	6.50– 8.30
7	Canterbury	4.00– 5.00	6.00	7.00– 8.00
8	Carlton	3.00– 3.50	5.00– 5.50	6.00
9	Cartwright	4.00– 5.00	6.00	7.00
10	Cecil	4.00– 5.00	5.00	6.50– 7.00
11	Chancellor	4.50–	6.00	7.00
12	Clift *	7.00–12.00	9.00–15.00	10.00–18.00
59	Commodore	4.00– 5.00	6.00– 7.50	7.00– 8.50
15	Crest	3.00– 4.50	4.00– 5.50	5.50– 6.50
16	Devonshire *	4.00–	5.00	6.00
16	Drake Wiltshire *	5.00– 6.00	6.00– 7.00	8.00– 9.00
17	El Cortez	3.50– 6.00	4.50– 7.00	6.00– 8.00
18	Embassy	3.50–	4.00	5.00
19	Fairmont *	8.00–13.00	11.00–16.00	11.00–16.00
20	Fielding	4.00– 6.00	5.00– 8.00	6.00– 8.00
21	Franciscan	2.50– 4.00	4.00– 5.00	5.50– 6.00
22	Golden State	3.00– 3.50	4.00– 5.00	6.00
23	Governor	3.00– 3.50	4.00– 5.00	6.00
60	Harcourt	3.00– 3.50	3.50– 4.00	5.00
24	Herbert	3.50– 4.00	4.00– 5.00	5.00– 6.00
25	King George	3.00– 4.00	4.00– 5.00	5.00– 6.00
61	Lafayette	4.00–	5.00	6.00
62	Lombard	4.00– 6.00	5.00– 8.00	6.00– 8.00
27	Manx *	3.50– 4.00	4.50– 5.00	6.50
28	Mark Hopkins *	8.00–11.00	11.00–15.00	11.00–15.00
31	Olympic *	3.50– 6.00	4.50– 6.00	6.00– 8.00
32	Oxford	3.00– 4.00	4.00– 6.00	6.00
33	Palace *	6.00–12.00	9.00–14.00	10.00–15.00
63	Palomar	3.50– 5.00	4.00– 6.00	4.50– 6.00
34	Pickwick *	3.50– 5.00	4.50– 6.00	5.50– 6.50
35	Plaza	5.00– 6.00	6.50– 8.50	7.00– 9.00
38	Roosevelt	3.00– 4.00	3.50– 5.00	6.00
39	St. Andrews	3.00–	3.50– 4.00	5.00
70	St. Francis *	6.00–14.00	8.00–14.00	10.00–18.00
42	Senate	3.00– 4.00	4.00– 5.00	5.00– 6.00
43	Senator	3.00– 3.25	3.50– 3.75	4.50– 5.00
44	Shaw	3.50– 4.00	4.50– 5.00	6.00– 6.50
45	Sheldon	3.00– 4.00	4.00– 5.50	5.50
46	Sir Francis Drake *	6.50–11.00	8.50–13.00	10.50–15.00
47	Spaulding	3.00– 4.00	4.00– 5.00	5.00– 6.00
48	Stewart	3.50– 5.00	5.00– 6.00	6.00– 9.00
49	Stratford	3.00– 4.00	3.50– 6.00	5.00– 6.00
50	Sutter *	3.00– 4.50	4.50– 7.00	6.00– 8.00
64	Travelers	3.50– 4.00	5.00– 5.50	6.00
52	Victoria	3.50– 4.00	4.50– 5.00	5.00– 6.00
53	Whitcomb *	4.50– 7.00	6.00–10.00	7.00–10.00
55	Y.M.C.A. Hotel	1.30 up		2.60 up
56	York	3.00– 4.00	3.50– 5.00	5.00– 6.00

* Parlor suites available. Rates on request.

SCIENTIFIC EXHIBITS AT THE SAN FRANCISCO ANNUAL MEETING

The Committee on Scientific Exhibits is accepting applications for scientific exhibit space at the 79th Annual Meeting. Health departments, schools of public health, and voluntary agencies are invited to participate. Individual research projects may also be exhibited.

Applications for space may be obtained from the Association Office—1790 Broadway, New York 19.

HOTEL RESERVATION FORM

MAIL TO: A.P.H.A. Housing Bureau
Room 200, 61 Grove Street
San Francisco 2, Calif.

Single rooms are very scarce. Please indicate if you would be willing to share a twin-bedded room with another member.
Yes ..... No .....

PLEASE MAKE RESERVATIONS NOTED BELOW:

First Choice ..... Hotel
Second Choice ..... Hotel
Third Choice ..... Hotel

Arrival: ....., at ..... a.m. ..... p.m.
Departure: ....., at ..... a.m. ..... p.m.

..... Single room @ $ .....
..... Double room @ $ .....
..... Twin-bedded room @ $ .....
..... Parlor, bedroom suite @ $ .....

NAMES OF ALL OCCUPANTS:

.....
.....
.....

ADDRESSES:

.....
.....
.....

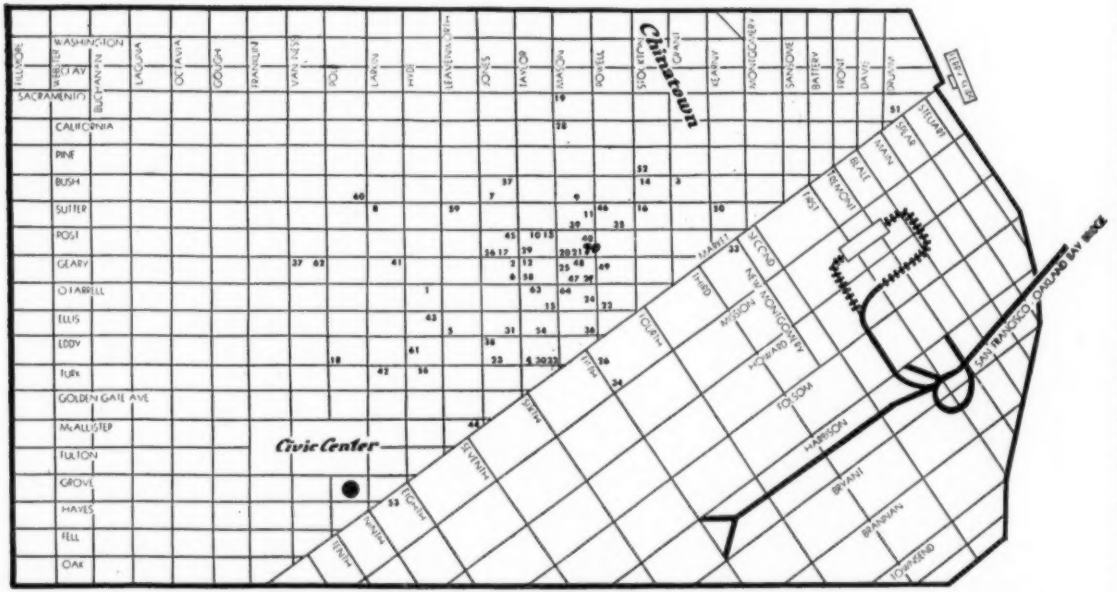
CHECK FOR $..... (MADE PAYABLE TO A.P.H.A. HOUSING BUREAU) IS ENCLOSED TO BIND THIS RESERVATION.

MAIL CONFIRMATION TO: Signed: .....

Address: ..... City Zone State

A STAMPED, SELF-ADDRESSED ENVELOPE WOULD BE APPRECIATED.

Street Plan of San Francisco Showing Location of Housing Bureau Hotels



Hotel Reservation form is on page 754. Please indicate your first, second, and third choice hotel. Single rooms are limited.

All reservations will be confirmed if requests are received not later than October 15.

ALL REQUESTS MUST BE ACCOMPANIED BY A DEPOSIT CHECK of $5 per person, or $10 per room, made PAYABLE TO THE A.P.H.A. HOUSING BUREAU. The deposit holds the room on your arrival day, regardless of the hour, and will be credited to your account. PLEASE DO NOT SEND U. S. POSTAL NOTES OR CASH.

Key

1 Alexander Hamilton
2 Bellevue
3 Beverly Plaza
57 Biltmore
4 Brayton
5 Cadillac
6 Californian
7 Canterbury
8 Carlton
9 Cartwright
58 Casa Nova
10 Cecil
11 Chancellor
12 Clift
59 Commodore
14 Court
15 Crest
16 Devonshire
16 Drake Wiltshire
17 El Cortez
18 Embassy
19 Fairmont
20 Fielding
21 Franciscan
22 Golden State
23 Governor
60 Harcourt
24 Herbert
28 Huntington
25 King George
61 Lafayette
26 Lankershim
62 Lombard
27 Manx
28 Mark Hopkins
30 New Dalt
31 Olympic
32 Oxford
33 Palace
63 Palomar
34 Pickwick
35 Plaza
36 Powell
37 Richelieu
38 Roosevelt
39 St. Andrews
70 St. Francis
41 San Carlos
42 Senate
43 Senator
44 Shaw
45 Sheldon
46 Sir Francis Drake
47 Spalding
48 Stewart
49 Stratford
50 Sutter
51 Terminal
64 Travelers
52 Victoria
53 Whitcomb
54 William Penn
55 Y.M.C.A. Hotel
56 York

ADVANCE REGISTRATION

FOR 79TH ANNUAL MEETING

AMERICAN PUBLIC HEALTH ASSOCIATION

SAN FRANCISCO, CALIF., OCTOBER 29–NOVEMBER 2, 1951

Members and Fellows of the American Public Health Association and other health workers who are not members who wish to register in advance for the San Francisco Annual Meeting are cordially invited to do so.

Each person should fill in the coupon below or a facsimile thereof and mail it with the registration fee to the Central Office. We will prepare for your attendance in advance and you can then pick up your program and badge without delay at a special section as soon as you arrive at Registration Headquarters in the Civic Auditorium. At that time your registration will have been recorded and it will only be necessary for you to supply your local hotel and room number to complete the registration procedure. If you know now at which hotel in San Francisco you will be staying, please add this information below.

Advance registrations cannot be accepted and recorded if received in Central Office after October 1, 1951.

Return to American Public Health Assn.,
1790 Broadway, New York 19, N. Y.

I wish to register in advance for the San Francisco Annual Meeting.

NAME .....

BUSINESS ADDRESS .....

CITY & STATE .....

TITLE OF POSITION .....

HOTEL IN SAN FRANCISCO .....

Non-member of A.P.H.A. Registration fee $4. ☐

Member of A.P.H.A. Registration fee $3. ☐

Fellow of A.P.H.A. Registration fee $3. ☐

Please send check or money order for amount shown

If you will be accompanied by your wife (or husband) or other dependent member of your family who is entitled to free registration, please list the name and address below:

NAME ..... RELATIONSHIP TO DELEGATE .....

STREET ADDRESS ..... CITY & STATE .....

EMPLOYMENT SERVICE

The following pages present information for those seeking qualified public health personnel and for those seeking positions in public health.

This is a service of the Association conducted without expense to the employer or employee.

POSITIONS AVAILABLE

Public Health Physician for attractive field office position, State Health Department; excellent Civil Service and retirement system; headquarters in university town; salary up to $8,712.

Public Health Physician as Assistant to Division of Local Health Services; salary up to $8,712.

For information on above positions, write Roland R. Cross, M.D., Director, State Department of Public Health, Springfield, Ill.

Health Officer for county of 35,000; salary $600 per month plus $65 per month travel allowance; retirement system, three weeks vacation, and two weeks sick leave with pay; excellent staff. Write: President, Lee County Board of Health, Dixon, Ill.

Opportunity for **Physicians** with special interest, or training in pediatrics or public health, available immediately in Milwaukee. Services to—infants—preschool—and school children annually. Appointments made under Civil Service, 40-hour week, annual vacation, and retirement benefits. Salary range $5,907 to $9,207. Write: Dr. E. R. Krumbiegel, Commissioner of Health, Health Department, Milwaukee 2, Wis.

Medical Health Officer for Shelby-Effingham County Health Department. Salary range $6,900–$9,000—may start above minimum; must have capacity for good public relations. Write: Mr. J. H. Griffin, Teutopolis, Ill., or Dr. O. G. Kauder, Findlay, Ill.

Deputy Health Commissioner with training or experience in public health. Initial salary up to $8,500 per year plus travel. Write: Saginaw County Department of Health, Saginaw, Mich.

Laboratory Director for City-County Health Department; to perform bacteriological, serological, and to a lesser degree hematological and chemical work for diagnostic purposes; train laboratory personnel; and do related work. Salary $4,000–$5,500 depending upon qualifications. Write: Director, Health Department, Kalamazoo, Mich.

Woman Physical Therapist. Visiting type service, under order of family physician or consultant; excellent working conditions; beginning salary, including travel allowance, $4,100; increase in six months.

Mental Hygienist with Public Health Nursing Training to do public health mental hygiene work with children in semi-rural area. Position offers retirement, paid vacation, sick leave, excellent working conditions, beginning salary, including travel allowance, $4,780, and increases as merited. Applicant should write stating public health training, nursing experience, mental hygiene training.

For information on above positions, write: R. L. Loftin, M.D., Director, Bay County Department of Health, Bay County Building, Bay City, Mich.

Managers Wanted—Several high caliber men for responsible positions with an outstanding pest control firm. Must possess high degree of integrity, initiative, sense of responsibility, good judgment, and ability to work under pressure; should be commercial (as opposed to research) minded and personally ambitious; training and practical experience as public health engineer, entomologist, sanitarian, food technologist, or related profession most desirable. Liberal salary arrangements with excellent opportunity for advancement. Company is largest of its type, operating in 21 southeastern, southwestern, and midwestern states, and still expanding. Send resumé, including photo, to: Technical Director, Orkin Exterminating Company, 591 Peachtree St., N.E., Atlanta, Ga.

Public Health Nurse: must have California Public Health Nurse Certificate; generalized county program; $280–$320 per month, 38 hour week, 15 working days vacation, mileage for car furnished. Write: Civil Service Commission, Room 105, Court House, San Luis Obispo, Calif.

Public Health Nurses for following positions—educational director; child welfare consultant; supervisor for a staff of 46 nurses. Combination agency—undergraduate student affiliation—40 hour week. For further information, write: Ruanna S. Gordon, Director, The Visiting Nurse Assn., 401 Municipal Bldg., Dayton 2, Ohio.

Staff Public Health Nurse for County Health Department in metropolitan New

York area. Salary range from $3,500 to $4,480—yearly increments of $140; 5 day week, 37½ hours, vacation, accumulative sick leave allowances, Civil Service merit system, retirement. Generalized rural nursing service including school nursing —requirements are one year of public health nursing in an approved school. Write to: Philip J. Rafle, M.D., Suffolk County Department of Health, 246 Griffing Ave., Riverhead, N. Y.

Staff Public Health Nurse—vacancy, August, 1951. Generalized service, official agency; salary scale $2,940–$3,540 for nurse who has completed one year's program of study in public health nursing in approved university; 3 weeks vacation and town retirement plan. For further details, write: Public Health Nursing Service, Town Hall Annex, Greenwich, Conn.

Public Health Nurses wanted for generalized program in suburban areas; staff education and students; 5 day week, vacation, sick leave, and retirement benefits. Write: John Davenport, Personnel Director, The Court House, Arlington County, Va.

Public Health Nursing Supervisor for City Health Department; 2 weeks vacation, 10 days sick leave, salary dependent on qualifications, education, and experience; 2 staff nurses in agency now. Write: Dr. J. C. Springber, Health Commissioner, Beloit Health Department, Beloit, Wis.

Tuberculosis Nurse with some experience and teaching ability to be Nursing Director of a 45 bed tuberculosis hospital. Salary and full maintenance provided. Write: William J. Peeples, M.D., Department of Public Health, P.O. Box 229, Columbus, Ga.

Public Health Nurse Supervisor in a community which is operated by General Electric Company for the U. S. Atomic Energy Commission; salary range $340–$400 a month; supervisory position in a generalized public health program including bedside nursing and school health. Extensive G. E. benefit plans including Pension Plan and Life and Health Insurance. Write to: Employment Office, General Electric Company, Richland, Wash.

Sanitarian—for summer work; six weeks beginning July 2. Salary $600 plus travel expense. Must have good knowledge of restaurant sanitation and private sewage disposal. Write: Chairman, Board of Health, Fairfield Health Department, 413 South Benson Road, Fairfield, Conn.

Health Officer—Grade I—for the City of Poughkeepsie. Starting salary $8,000. Write: Edith G. Mead, M.D., Board of Health, Poughkeepsie, N. Y.

POSITIONS WANTED

Public Health Dentist—D.D.S., M.P.H. Experienced administrator and clinician; well trained in public relations and organization; presently employed on the City-County level as Dental Director. Desires position on state level, or as administrator of a group plan; age 34. Write: **Box D-8,** Employment Service, A.P.H.A.

Wanted: Position as **Sanitary Engineer** or **Sanitarian** by 1951 graduate in Sanitary Option of Civil Engineering; experience—four years surveying and mapping; prefer sewage treatment plan operation or stream pollution control work. Available September 1, 1951. Write: **Box E-14,** Employment Service, A.P.H.A.

Advertisement

Please direct all inquiries to Burneice Larson, Director, The Medical Bureau, Palmolive Building, Chicago 11, Illinois

Opportunities Wanted

WANTED—Opportunities for group of well qualified public health physicians and dentists, public health nurses, health educators, statisticians, sanitary engineers, and laboratory workers. Candidates available for administrative, academic and staff appointments. All negotiations strictly confidential. Please outline your requirements, and credentials of qualified candidates will follow. The Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago, Ill.

Opportunities Available

WANTED—Public health physicians and dentists, health educators, public health laboratory personnel, sanitary and industrial engineers for administrative, academic and staff appointments. Opportunities in all parts of America including countries outside continental United States. All negotiations strictly confidential. Please send for our ANALYSIS FORM so that we may prepare an individual survey of opportunities in your particular field. The Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago, Ill.

WANTED—(a) Public health physician to direct county health department; $10,000; short distance from Chicago. (b) Director, department of public health nursing, general hospital; department handles nursing services for insurance companies; East. (c) Health educator; county health association; university town, Middle West. (d) Public health nursing supervisor; county health department; California; (e) Chairman, department of public health; university medical school. (f) Chief nurse to direct health department, public schools; town of 80,000, Middle West. (g) Woman physician to direct student health department, young women's college; East. The Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago, Ill.

NEWS FROM THE FIELD

FIGHTING ON THE NON-MILITARY FRONT

Improvement in food production and living standards for the more than one billion persons of underdeveloped areas has been suggested by the International Development Advisory Board. In a report to President Truman the chairman of this board, Nelson Rockefeller, proposes a world-wide aid program that would employ economic forces to attack hunger, disease, poverty, and illiteracy. Such a program, it is suggested, would be more effective than military means in keeping this vast population on the side of freedom.

The nine point program suggested by the board is summarized as follows:

1. Appropriation of $500,000,000 in economic assistance to these areas, apart from emergency military needs.
2. Creation of a single agency—The U. S. Overseas Economic Administration — for foreign economic operations including ECA, TCA, and the Institute of Inter-American Affairs.
3. A realistic program for strengthening the economics of underdeveloped areas and improving the living standards of their people.
4. An all-out drive for increasing food production by 25 per cent in underdeveloped areas.
5. A development program to increase the flow of strategic materials from abroad by 50 per cent. This would require some or all of health services, land reforms, irrigation, reclamation, agricultural tools, and education in modern agricultural methods.
6. A policy for assuring underdeveloped areas all essential imports.
7. Creation of an International Development Authority, which should under contract with the International Bank for Reconstruction and Development, help finance public works vital for progress.
8. Adoption of the principle that all United States aid provide for some measure of cooperative local services and financing through creation of regional institutes such as the Institute of Inter-American Affairs.
9. A program to double the present $1,000,000,000 United States private investments in foreign countries.

This board was appointed in November, 1950, by the President. Besides Mr. Rockefeller, it includes 12 members representative of business, labor, farmers, education, engineering, and public health. Dr. Thomas Parran, former surgeon general, U. S. Public Health Service, and now dean of the University of Pittsburgh School of Public Health, is a member of the board. The board's proposals are a logical extension of the Point Four Program first enunciated by President Truman in his 1949 inaugural address.

The full text of the summary of the report as well as a number of additional news items concerning it were published in the *New York Times* of March 12, 1951.

CONFERENCE ON SCHOOL CHILDREN

In March a Conference for the Mobilization of Health Education, Physical Education, and Recreation, was held in Washington at the call of the National Association of Health Education, Physical Education, and Recreation. The American Public Health Association was represented by the secretary of its Maternal and Child Health Section, Edward Davens, M.D., who is also director, Bureau of Child Hygiene, Maryland State Department of Health.

Dr. Davens reports that about 250 persons attended the conference. He found that the interrelations between physical, emotional, and social factors of health had penetrated into educational thinking to an impressive extent. Said he "It would appear that schools are much further along in planning for the basic needs of children in terms of their characteristics at different levels of development than our hospitals."

Dr. Davens served on the working committee on physical education pro-

grams for elementary school children, one of the nine into which the conference was divided. This group reviewed a draft about to be published of the "Report of the National Conference on Physical Education for the Elementary School Child, January 10–17, 1951."

One of the pronouncements that came out of this group was that, "The national emergency has not changed the basic need of boys and girls of elementary school age; rather it has fostered attention upon the failure generally of elementary schools to provide adequate programs of physical education." Because of this, the group was unwilling to use the present national emergency as the reason for developing a physical education program that should be part of the permanent programming for the school child.

NATIONAL HEALTH COUNCIL MEETS

More coöperative thinking between the medical sciences and other fields—particularly engineering and education—is vital to the conservation of human resources, Dr. Detlev W. Bronk, president, Johns Hopkins University, told an audience of 200 at the 31st annual meeting of the National Health Council in New York City, April 6.

Chief speaker at a dinner session of Council member agency delegates and their guests, Dr. Bronk, who is also president of the National Academy of Sciences, said: "The very fact that medical discoveries make possible new cures for disease, new ways of preventing disease, new surgical and diagnostic procedures, raises new economic problems which must be solved if these great medical discoveries are not to be tarnished by our inability to solve the social-economic problems which are thus created."

He also urged that more consideration be given to "the conservation and development of intellectual ability." He said: "The mere conservation of physical resources is not enough to satisfy men and women. . . . Curiosity and intellectual ability are among the most valuable assets of our national resources." Fear of the future, fear of the uses to which our mounting knowledge might be put, he warned, is sapping the confidence and courage of the American people.

Dr. Robert H. Parry, medical officer of health, Bristol, England, spoke at the dinner on experience in meeting the civil defense problems of that much-bombed city during World War II. Decentralization of the population, he declared, is the key to the saving of lives during bombing attacks. He continued: "We believe strongly in organizing the home and strengthening it as much as we can. We did not like the public shelters at all on public health grounds and for other reasons. They are difficult to keep dry. They are cold. And, of course, they collect large numbers of people together."

Civil defense plans of various government agencies and voluntary and professional organizations were discussed at an afternoon symposium on "Mobilization for Health Security—A Challenge to the Voluntary Health Agencies." Leading the discussion were:

Surgeon General Leonard A. Scheele, U. S. Public Health Service

Norvin C. Kiefer, M.D., Director Health Services & Special Weapons Defense Division, Federal Civil Defense Administration

Brig. Gen. Albert H. Schwichtenberg, Armed Forces Medical Policy Council, Department of Defense

G. Foard McGinnes, M.D., Vice-President American National Red Cross

George F. Lull, M.D., Secretary and General Manager, American Medical Association.

Harry S. Mustard, M.D., Chairman, Committee on Public Health in the Defense Program, American Public Health Association

Marcus D. Kogel, M.D., Commissioner of Hospitals, Director, Medical Emergency Division, Office of Civil Defense, New York City

Pearl McIver, R.N., Chairman Joint Committee on Nursing in National Security

In its 6,000 word annual report (now

available on request) the Council stresses the "growing recognition by the public that health is essential to national security." It urges member agencies, through their local and state affiliates, to participate more actively in joint community activities for expansion of health service.

Officers elected for the current year are:

President: Ernest L. Stebbins, M.D.
President-Elect: Mrs. Oswald B. Lord
Vice-Presidents: Herman E. Hilleboe, M.D.
Robin C. Buerki, M.D.
Margaret Hickey
Treasurer: Philip R. Mather
Assistant Treasurer: Herbert I. Wood
Secretary: Mefford R. Runyon

EIGHT BILLION FOR MEDICAL CARE

Columbia University has undertaken a two year research study to find out how Americans spend the $8 billion paid annually for private medical and hospital care. Among the findings of the study, which will be made available to the public, will be the number of persons covered by medical and hospital prepayment plans, types of illnesses covered, medical services provided, and possible further progress in such plans.

The study will be conducted by Professor Oscar Serbein, Jr., of the Graduate School of Business, under a grant of $92,000 from the Health Information Foundation, a non-profit organization which collects and disseminates health information.

ARIZONA JOINS HEALTH AND WELFARE

A new law in Arizona, to become effective July 1, 1951, creates a new Department of Public Health, Welfare, and Correction with four divisions—Administration, Public Health, Public Welfare, and Detention and Correction. This represents the third state among the 48 in which health and welfare are combined in one department. The duties of the Division of Public Health will include the functions of the present Department of Health, the state registrar, state laboratory, the health and sanitation duties of the state dairy commissioner, the crippled children's program, coördination with the state tuberculosis sanatorium and provision of technical assistance for the medical care and sanitation aspects of the state institutions. The existing state board of health is specifically abolished and a new board of public health, welfare, and correction created, two members of which are physicians, one of whom may be an osteopath.

To head the new consolidated division, C. G. Salsbury, M.D., has been selected. He has been for the past six months chief of the Bureau of Preventable Diseases in the State Health Department. In March he began work in preparation for organization of the new department on July 1.

PUBLIC HEALTH IN COLOMBIA

Leona Baumgartner, M.D., assistant commissioner, New York City Department of Health and member of the Executive Board, American Public Health Association, reports an increasing interest in public health and preventive medicine throughout Colombia, which she recently visited as an official representative of the A.P.H.A. She reports that in addition to the teaching of public health there are active projects in sewage disposal, water filtration, in immunization and tuberculosis case finding under way in many parts of the country.

With the coöperation of the Rockefeller Foundation, Colombia is developing a postgraduate school of public health with Dr. Jorge Boshell Manrique as its first director. The school has just completed a six weeks postgraduate course for 172 sixth year medical students. The curriculum included epidemiology, statistics, and general principles and procedures of public health. Even more significant seems to be the development of teaching public health

and preventive medicine to the undergraduate medical student as a part of his regular course of study. Dr. Jorge Bejarano, long considered the "father" of public health in Colombia, and Dr. Boshell reported that some 203 hours had been set aside in the medical school curriculum for the teaching of public health. Bogota boasts a modern school of nursing, operated coöperatively by the Office of Inter-American Affairs, the Rockefeller Foundation, and the Colombian government.

The Carlos Finlay Institute in Bogota, from whose laboratories much knowledge of yellow fever and its control have come and where many public health workers of the Rockefeller Foundation and other organizations have worked, is now operated entirely by the Colombian government under the direction of Dr. Manuel Roca-Garcia. Among other activities, yellow fever vaccine is made here and distributed to the majority of South American countries.

Colombia has its own public health association, La Sociedad Colombiana de Salud Publica, which meets regularly. Dr. Alberto Albornoz was last year's president. Several members expect to attend the San Francisco meeting of the A.P.H.A. next fall.

NEW ASSOCIATE CHIEFS OF CHILDREN'S BUREAU

The appointment of two new associate chiefs of the Children's Bureau was announced in Washington in April. Katherine Bain, M.D., who for the last ten years has been director of the Children's Bureau Division of Research, and Melvin A. Glasser who was executive director of the Mid-Century White House Conference on Children and Youth, were appointed to the new positions.

Katherine F. Lenroot, the chief of the Children's Bureau, said that the two new posts of associate chief were created to throw added emphasis on two phases of Children's Bureau work, namely, child research and community services for children. The Children's Bureau previously has had one associate chief which for many years was Martha M. Eliot, M.D., now associate director general, World Health Organization, Geneva, Switzerland, and more recently, Leona Baumgartner, M.D., now assistant Commissioner of Health in the New York City Department of Health.

EASTERN OKLAHOMA HEALTH SURVEY

The child health study of eastern Oklahoma, made late in 1951 by Ira V. Hiscock, Sc.D., and a staff of assistants, has been published in a closely printed document of nearly 100 pages. The area covered by the study includes 24 counties with a population of more than three-quarters of a million persons. The child health situation is described within the framework of the total public health situation in the area.

Of the 24 counties, 18 are organized in 10 separate health departments serving from 1 to 3 counties. The survey includes a special section on the public health services of Tulsa, the largest city and trading center for the area.

The reports indicate a high degree of coöperation among agencies in the area both in making the study and in planning for and carrying out community activities. Financial assistance in making the study was provided by the Junior League of Tulsa, the Oklahoma Society for Crippled Children and Adults, and the State Health Department.

TRAINING PUBLIC HEALTH NURSES

A program of study leading to the Master of Public Health degree with a major in Public Health Nursing Supervision has been planned for the coming academic year in the University of North Carolina School of Public Health. A limited number of qualified applicants will be admitted in the fall for 1951–1952.

General requirements are a Bachelors

degree, graduation from an approved school of nursing, completion of an approved program of study in public health nursing, and 3 years' experience in some field of public health practice.

Further information from Ruth W. Hay, Professor of Public Health Nursing, School of Public Health, Chapel Hill, N. C.

LABOR UNION EXTENDS HEALTH SERVICE

A million dollar health center to serve the 40,000 members of the Amalgamated Clothing Workers was dedicated in New York City in April, 1951, as a memorial to the late Sidney Hillman, founder and first president of the Union. In addition to the usual outpatient services of a health center, provision has been made for a research program in cardiovascular diseases and arthritis. This research, some of which will be financed in other institutions, will be under the supervision of Ernst P. Boas, M.D., cardiologist and specialist in chronic diseases. Morris Brand, M.D., is the medical director of the center.

Unlike other union health centers, the operation of this one will be financed entirely by the workers themselves by an increase in their annual dues. Its construction was financed in part from funds given by the New York Clothing Manufacturers Exchange.

SURVEY TO FIND DANGER SPOTS

The United Community Defense Services has under way an extensive survey to determine the areas that are vulnerable because of lack of community services. The U.C.D.S. is part of the United Defense Fund organized late in 1950 to carry out much of the work done in World War II by USO and other wartime agencies. The Defense Fund carries on its activities largely in behalf of the Armed Services; the Defense Services, on the other hand, "coördinates health and welfare agencies for the aid and comfort of civilians." Its survey will determine where field representatives are needed to help "in banding together organizations and tying all together in a common pattern to meet the current problem." John H. Moore, assistant director of the National Social Welfare Assembly, is executive secretary of U.C.D.S.

THE CIVIL DEFENSE ALERT

The Federal Civil Defense Administration, Washington, D. C., in April, 1951, began a newsletter for state and local civil defense staffs. "Its aim is to bring you news of what is happening nation-wide in the field of civil defense." It asks for information—through the state civil defense director—"Sufficiently interesting, unusual, and significant to be of value to other civil defense workers." *Alert* is presumably free.

TRAINING COURSE IN SANITATION

A practical course in the fundamentals of sanitation, including both classroom and field training, will be given by the U. S. Public Health Service at the Topeka, Kan., Field Training Center, Aug. 27–Nov. 16 for persons employed in sanitation by health departments or industries. Tuition, free. For further information: Regional Medical Director, U.S.P.H.S., 911 Walnut St., Kansas City, Mo.

DECLINE IN VENEREAL DISEASES

Because of a steady decline in New York City's venereal disease case load, the Central Social Hygiene Clinic of the City Department of Health was closed at the end of March, 1951. Thereafter, patients were cared for in the 14 neighborhood clinics throughout the city. The peak of VD cases reported in the city was reached in 1946 with more than 13,000 cases of infectious syphilis and more than 24,000 of gonorrhea. By 1950 there was a 60 per cent decline in infectious syphilis and 31 per cent in gonorrhea.

NATIONAL COUNCIL ON ALCOHOLISM

A National Medical Council has been formed to work with the Yale Center of Alcoholic Studies, New Haven, with the aim of rehabilitating problem drinkers in industry. These are estimated to exceed 2 million in the United States.

John J. Wittmer, M.D., is chairman of the group. Dr. Wittmer, who is a vice-president and medical director of the Consolidated Edison Company of New York and assistant treasurer of the American Public Health Association, said that the key to the rehabilitation program was the finding of the problem drinker whom he described as "the hidden man in industry."

Dr. Selden D. Bacon, director of the Yale Center of Alcoholic Studies, indicated that the project had received the approval of large industrial concerns.

PUBLIC HEALTH SPECIALTY BOARD EXAMINATION

Ernest L. Stebbins, M.D., Secretary-Treasurer of the American Board of Preventive Medicine and Public Health, Inc., has announced that written and oral examinations will be offered by the board to public health physicians in San Francisco, Calif., immediately preceding the dates for the 79th Annual Meeting of the American Public Health Association.

The written examination will be given on Sunday, October 28, followed by the oral examination on Monday, October 29.

Persons interested in applying for these examinations should communicate with Dr. Stebbins, 615 North Wolfe Street, Baltimore 5, Md.

NURSING ASPECTS OF ATOMIC WARFARE

In mid-February was completed a series of 5-day courses for nurses in 6 cities of the United States. Their purpose was "to prepare carefully selected nurses to serve as key persons in developing educational programs on the nursing aspects of atomic warfare in their own states." The courses were given by the U. S. Public Health Service and the Atomic Energy Commission under the sponsorship of the National Security Resources Board.

A total of 347 nurses from the United States and 24 from Canada completed the course. Nurse coördinators in planning and conducting courses were Ruth Freeman, nursing consultant, Health Resources Office, N.S.R.B., and Frances Tyler, nurse member, Radiological Health Team, U.S.P.H.S.

PUBLIC HEALTH WORKERS ELECTED TO NATIONAL ACADEMY OF SCIENCES

Among the 29 American scientists elected to membership in the National Academy of Sciences, Washington, at the annual business meeting held in April, were the following persons having links with public health:

Charles Glen King, Ph.D., scientific director of the Nutrition Foundation, New York, and member of the Executive Board, A.P.H.A.

Albert B. Sabin, M.D., professor of research pediatrics, Children's Hospital Foundation, Cincinnati, Ohio.

William S. Tillett, M.D., head of the Department of Medicine, New York University College of Medicine, a recipient of an A.P.H.A. Lasker Award in 1949.

John T. Edsall, M.D., associate professor of biological chemistry, Harvard Medical School.

The total membership in the academy is now 481.

AMERICAN RED CROSS CHANGES MEDICAL DIRECTORS

According to an announcement by the American National Red Cross late in April, G. Foard McGinnes, M.D., Dr.P.H., who for the last 7 years has been medical director, has resigned, effective July 15.

President E. Roland Harriman of the Red Cross announced that Major General David N. W. Grant, who was Air Force Surgeon General in World War II,

will become medical director and will also direct the National Blood Program.

Ross T. McIntire, M.D., will continue as chairman of the Medical Policies Committee and of the Procedures Committee for Blood Programs. Russell L. Haden, M.D., will become associate medical director of the Blood Program with responsibility for its medical phases.

CORRECTION

The May issue of the *Journal* carried a report on Public Health in the Defense Program, being a report of the Committee on Public Health in the Defense Program which has been approved by the Executive Board. Through an inadvertence on page 586, the name of James Stevens Simmons, M.D., as a member of the committee was omitted. Dr. Simmons, Dean of the School of Public Health at Harvard University, is also president of the Association of Schools of Public Health and has taken an active part in the work of this Committee.

WHO NEWS

Southeast Asia Activities Reviewed

The WHO Regional Office for Southeast Asia was two years old in January, 1951. The Regional Committee of representatives from 8 countries of the area recently held its third session. The *WHO Chronicle* of February summarized activities in the region and reports that "Largely as a result of the experience gained by the Southeast Asia Regional Office, which was established early, WHO has now decided to carry its regionalization policy further and to make regional offices entirely responsible for their own administrations and budgets and, in coöperation with the regional committee, for drawing up as well as executing regional programs, a minimum of guidance being given by Headquarters."

Malaria control projects are reported in many areas with universal improvement in general health resulting. Each project includes training of local workers who will carry on and extend the operations. Developments in venereal disease, tuberculosis and typhus control, in maternal and child health and nursing services are summarized. The thread that runs through each of them is the training for and development of local responsibility.

In 1949 and 1950, 71 WHO fellowships have been awarded to these countries, the largest number being 31 to India. These provide for specialized training up to a year, in other countries, in public health administration, sanitary engineering, pediatrics and child care, nursing, and control of such diseases as tuberculosis, malaria, and the venereal diseases.

Monograph Series

One of WHO's recent Monograph Series is *Psychiatric Aspects of Juvenile Delinquency* by Lucien Bovet, its consultant in mental health. It was prepared as a contribution to the United Nations' program for the prevention of crime and the treatment of offenders. The author's aim was to set forth the multiplicity of the problems rather than to solve them.

Maternal Care and Mental Health by John Bowlby, consultant in mental health and director of the child guidance department of London's Tavistock House, is another recent item in the series. The mental health aspects of the problem of homeless children are here discussed and the paramount importance of building up the home stressed.

Both volumes are available from WHO Palais des Nations, Geneva, Switzerland, $1 and $2 respectively.

Fellowships

A recent report indicated that about 800 fellowships to medical and allied personnel for advanced study had already been awarded by WHO. In 1951,

it is anticipated that more than 250 additional fellowships will be awarded. Applications for these fellowships are made through the applicant's government.

World Health Day

The theme of 1951 World Health Day, April 7, was, "Health for your child and the world's children." It was the third anniversary of the date when the WHO constitution became effective. In a statement, WHO's director-general, Brock Chisholm, M.D., said, "What needs to be stressed is the very intimate relationship which exists between the health of the child—when defined as total health—and the solution of the great crisis which confronts humanity today. The world will be what our children and the children of the next generation make it."

PERSONALS

LEWIS W. ANDREWS, M.P.H.,* formerly director of public health education and statistics for the Wichita-Sedgwick County (Kansas) Department of Public Health, is now executive secretary of the Health Council of Kansas City, Mo.

WILLIAM H. BARTON, health program representative, has been assigned by the U. S. Public Health Service to the Alaska Department of Health to work in the Venereal Disease Unit of the Communicable and Preventable Disease Section in the department's Juneau office.

CLARISSA BOYD,† who has recently been on leave completing work for the M.P.H. degree at the Yale School of Public Health, has succeeded JAMES STONE * as director of program development service, National Tuberculosis Association. She has been associate director for the past 3 years.

LYLE L. CAMERON,† executive secretary, Indiana Council for Children and Youth, Indianapolis, has been appointed director, Riverview Neighborhood House, Cincinnati, Ohio.

JOHN H. CASEBOLT, veteran of World War II, has succeeded HENRIETTA CROCKETT,† retired, as executive secretary of the Montana Tuberculosis Association, Helena.

H. J. CORPER, M.D., director of Research for the National Jewish Hospital, Denver, Colo., for the last 31 years, has recently retired.

EDWIN F. DAILY, M.D.,* for several years director of the Division of Health Services in the Children's Bureau, Washington, has resigned to accept a position as deputy director of the Health Insurance Plan of Greater New York, New York City.

M. B. DONALDSON, M.D.,† formerly medical officer for the City of Westmount in Quebec, Canada, is now in the Professional Service Department of Lederle Laboratories, a division of American Cyanamid Company, 30 Rockefeller Plaza, New York City.

ROLLA E. DYER, M.D.,* now of Emory University School of Medicine, Atlanta, recently received the James Bruce Memorial Medal for 1951 from the American College of Physicians. Dr. Dyer received the Sedgwick Memorial Medal of the American Public Health Association at the 1950 Annual Meeting.

ELAINE GOBEN, R.N.,† formerly educational consultant, Colorado State Board of Nurse Examiners, has been named generalized nursing consultant, Idaho State Department of Health, with headquarters in Boise.

CARL E. GREEN,* former consulting engineer of John W. Cunningham & Associates, has established his own consulting engineering practice, Carl E. Green & Associates, Portland, Ore.

GRACE S. HARPER, director of the Commission for the Blind, State Department of Social Welfare, for 31 years, was given a testimonial dinner on April 16 by her friends and associates at the Waldorf-Astoria, New York City, on the occasion of her retirement on May 31.

REBA F. HARRIS,* secretary of the Public Health Education Section of the A.P.H.A., 1945–1947, has submitted her resignation as chief of the Division of Public Health Education of the Ohio Department of Health to return to her home in Eustis, Fla.

JOHANNES IPSEN, M.D.,† associate professor of public health, Harvard School of Public Health, has been appointed superintendent of the newly formed Massachusetts Institute of Laboratories, in which have been consolidated the four state-operated laboratories—the biologic, the diagnostic, the Wassermann and the blood laboratories. Dr. Ipsen will continue his Harvard teaching activities.

WALLACE F. JANSSEN, formerly managing editor of Food, Drug, Cosmetics Reports, has been appointed assistant to the Commissioner, U. S. Food and Drug Administration, to head up its trade and public information activities.

SALLY LUCAS JEAN,* New York, N. Y., retired June 1 from the staff of the National Foundation for Infantile Paralysis, where she has been director of Education Service for 8 years. Miss Jean is engaged in writing

a book on the development of the health education movement.

DOROTHY C. KAHN, former director of the Welfare Council of New York City, has been appointed chief of the Social Services Section, Department of Social Affairs, United Nations.

JOSEPHINE R. KEOUGH, R.N.,† who during World War II was an army nurse with the rank of second lieutenant, has been appointed assistant professor in the School of Nursing, Adelphi College, Garden City, N. Y.

CHARLES A. KIENTZ,† health officer of North Arlington, N. J., received on April 12 the annual honorary certificate of the New Jersey Unit of the American Society of Dentistry for Children, for his contribution to children's dentistry, at the society's meeting in Atlantic City.

L. E. KLING, M.D., M.P.H.,† associate professor and head, Division of Health Education, Columbia University, New York City, has been appointed county health officer, Beaufort County, North Carolina, with headquarters in Washington.

LT. COL. LOUIS C. KOSSUTH,† chief, preventive medicine branch of the U. S. Air Forces in Europe air surgeon's office, was named a U. S. delegate to the special committee to consider the draft of international sanitary regulations prepared by the expert committee on international epidemiology and quarantine, which met in Geneva, April 9.

JAMES E. KRAFT, M.D., has been named health officer for Cherokee, Sequoyah, Adair, and Delaware Counties in Oklahoma.

ETHEL AUSTIN MARTIN,* director of the Department of Nutrition Service, National Dairy Council, retired on June 1 after 22 years of service. She plans to continue active in the field of nutrition serving as a special consultant to MILTON HULT, National Dairy Council president.

LESTER S. MCLEAN, M.D.,* for the past 8 years director of the Vallejo-Solano County (Calif.) Health Department, has been made director of local health services, Montana State Board of Health.

RICHARD L. MEILING, M.D., has resigned as chairman of the Armed Forces Medical Policy Council, Department of Defense to return to his medical and academic responsibilities at the University of Ohio School of Medicine, Columbus, from which he has been on leave.

FRED A. MILLER, serologist, has been named director of the Kentucky State Health Department's Public Health Laboratories, succeeding LILLIAN H. SOUTH, M.D.,* who has become consulting director after 40 years as director.

ANDREW C. OFFUTT, M.D., previously in the Medical Corps of the U. S. Army in Paris and in Frankfurt, preparing for the hospitalization of troops and later in the United States developing a pattern of residency training programs for the medical corps, has been appointed director of Communicable Disease Control, Indiana State Health Department.

AURORA O. RIVERA, M.D., has been appointed epidemiologist and assistant director of Bureau of Venereal Diseases, Washington, D. C., Health Department succeeding A. TRUXTON MORGAN, M.D., now on active military duty in Korea. Dr. Rivera was in the Philippine Health Department and after the Japanese invasion joined the guerilla forces and became a lieutenant in the Medical Corps.

HERMAN F. STRONGIN, M.D.,† dirctor of public health in North Adams, Mass., since 1950, has resigned effective April 30.

RALPH W. G. WYCKOFF, Ph.D., of the National Institutes of Health, Bethesda, Md., has been elected a member of the Royal Society of Great Britain, an organization for the advancement of science, in recognition of his contributions to the study of viruses.

DEATHS

JOHN L. AMT, field consultant, Division of Vital Records, Indiana State Board of Health, died March 1.

DAVID T. BLAKE,† Health Officer, Princeton, N. J., died April 19 (Health Officers Section).

BENJAMIN C. KEEPING, M.D., D.P.H.,† chief health officer, P.E.I. Department of Health and Welfare, Charlottetown, Canada (Health Officers Section).

PHIL J. KIRCH, executive secretary of the Wisconsin Association for the Disabled, died February 12 in Madison at the age of 65.

IDA W. ROTHSCHILD, M.D.,† school physician, New York City Department of Health (School Health Section).

CARL A. SCHERER, M.D.,† health officer of Sutter-Yuba (Calif.) Health Department until September, 1950, when he resigned because of ill health, died December 13, 1950 (Health Officers Section).

WALTER W. SCOFIELD † of Trenton, N. J. (Food and Nutrition Section).

JOHN D. B. SCOTT,† director, Division of Vital Statistics, Provincial Board of Health, Victoria, B. C., Canada (Statistics Section).

FRANK STAFFORD,† U. S. Office of Education, Washington, D. C., was killed when returning from Detroit, where he was elected President of the American Association for Health, Physical Education and Recreation. His wife was also killed (School Health Section).

* Fellow.
† Member.